Bay Area Report—1963

By J. P. SINCLAIR, Assistant State Highway Engineer

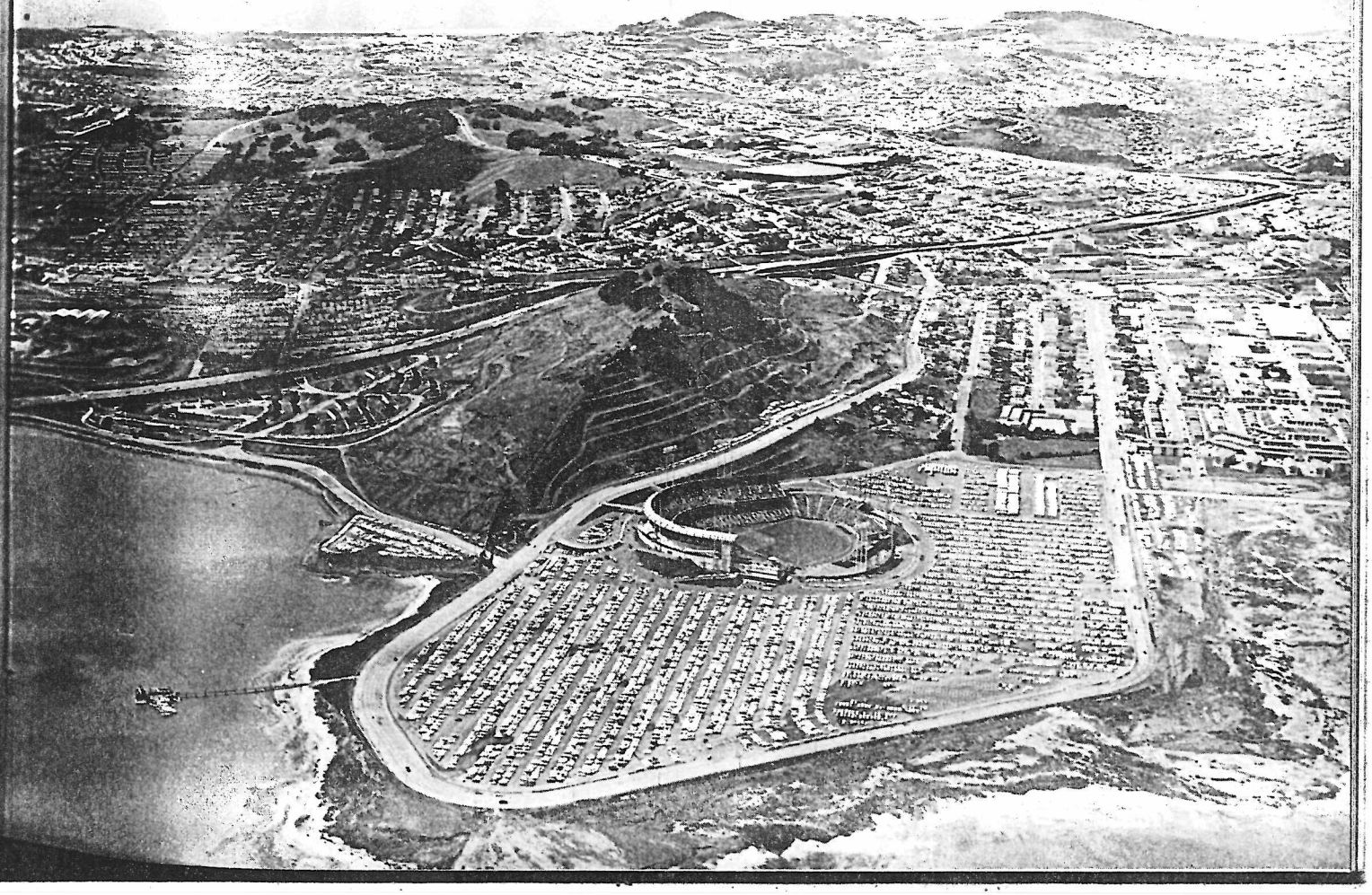
The best descriptive phrase that can be applied to highway development within the San Francisco Bay area in recent years is that of "reaching out." Where less than two decades ago we found traffic inching along historic routes designed for traffic conditions of the 1930's, today many of these routes have been improved to high-standard freeways connecting the important residential, commercial and industrial centers of the Bay area.

To visualize these improvements, think of the conditions existing at the close of World War II. The Bay area, which for almost five years had served as an important center for support of military operations, was long overdue for improvements in its transportation system. Peaceful suburban towns surrounding the financial centers of the Bay, San Francisco and Oakland, were about to explode into densely populated and highly developed areas.

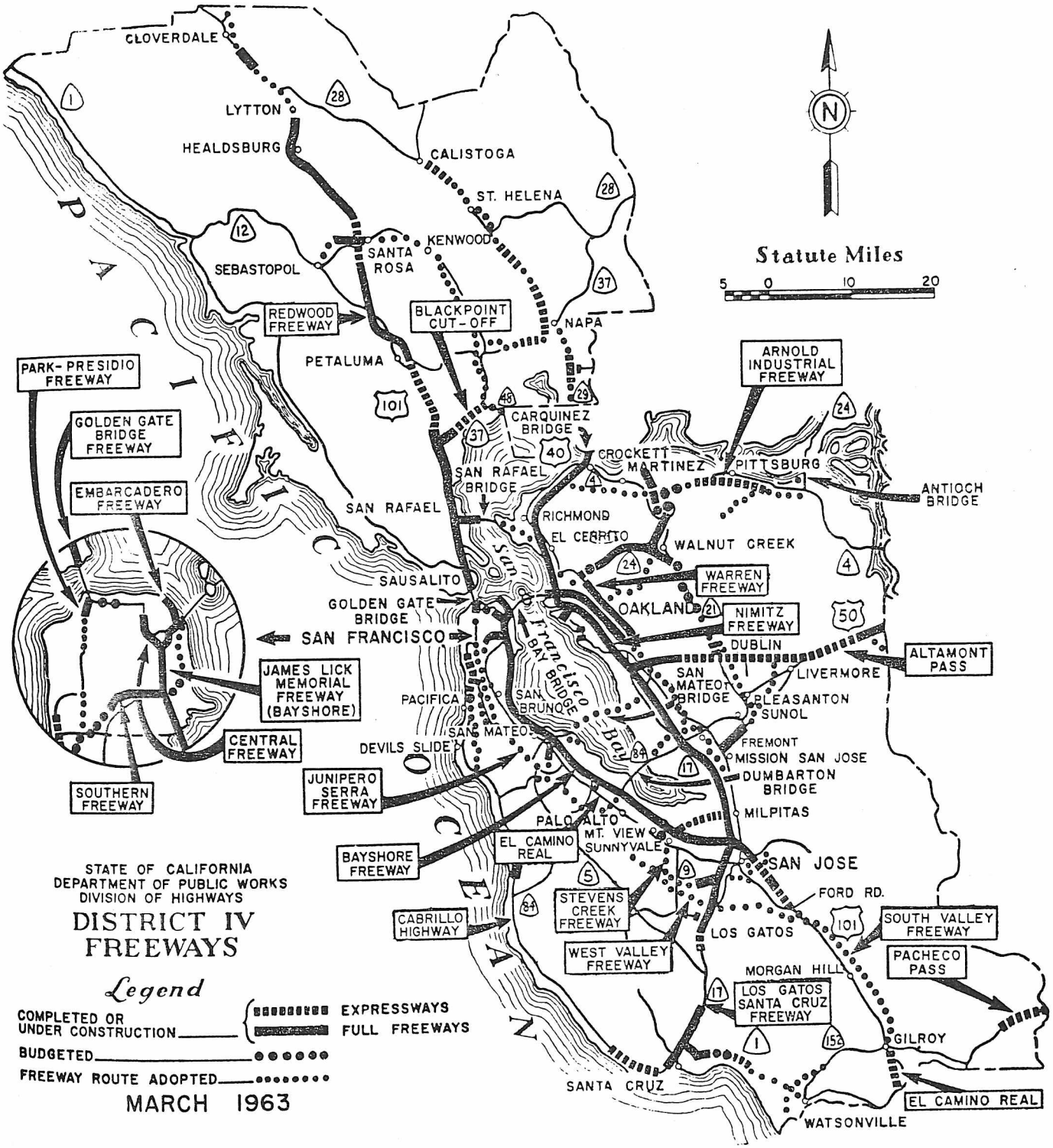
Old Highways Congested

Highway facilities in the area, in the main, consisted of two-lane, at best four-lane, roads connecting the Peninsula, Marin and East Bay communities. Within the cities, streets served as arteries for highway traffic which was continually hampered by traffic to and from adjacent commercial properties.

On the Peninsula, two main routes served the commuter and through traffic between South Bay points and San Francisco. One of these routes, Bayshore Highway, authorized by the Legislature in 1923, traversed the marginal tidelands on the west side of the Bay. Farther to the west, tree-lined



Candlestick Park on the opening day of the 1963 baseball season. The view is westward across the peninsula with the Bayshore Freeway crossing in the middleground and the Southern Freeway-Alemany Boulevard interchange visible to the right.


CLOVERDALE
LYTTON
HEALDSBURG
CALISTOGA
ST. HELENA
SEBASTOPOL
SANTA ROSA
KENWOOD
NAPA
PETALUMA
REDWOOD FREEWAY
BLACKPOINT CUT-OFF
PARK-PRESIDIO FREEWAY
GOLDEN GATE BRIDGE FREEWAY
EMBARCADERO FREEWAY
SAN RAFAEL
SAN RAFAEL BRIDGE
CARQUINEZ BRIDGE
CROCKETT
MARTINEZ
PITTSBURG
ARNOLD INDUSTRIAL FREEWAY
ANTIOCH BRIDGE
RICHMOND
EL CERRITO
WALNUT CREEK
WARREN FREEWAY
SAUSALITO
GOLDEN GATE BRIDGE
SAN FRANCISCO
OAKLAND
NIMITZ FREEWAY
DUBLIN
ALTAMONT PASS
LIVERMORE
PLEASANTON
SUNOL
SAN MATEO BRIDGE
JAMES LICK MEMORIAL FREEWAY (BAYSHORE)
PACIFICA
SAN BRUNO
SAN MATEO
DEVILS SLIDE
CENTRAL FREEWAY
SOUTHERN FREEWAY
JUNIPERO SERRA FREEWAY
FREMONT
MISSION SAN JOSE
DUMBARTON BRIDGE
MILPITAS
PALO ALTO
MT. VIEW
SUNNYVALE
EL CAMINO REAL
BAYSHORE FREEWAY
SAN JOSE
FORD RD.
CABRILLO HIGHWAY
STEVENS CREEK FREEWAY
LOS GATOS
SOUTH VALLEY FREEWAY
WEST VALLEY FREEWAY
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FREEWAY ROUTE ADOPTED
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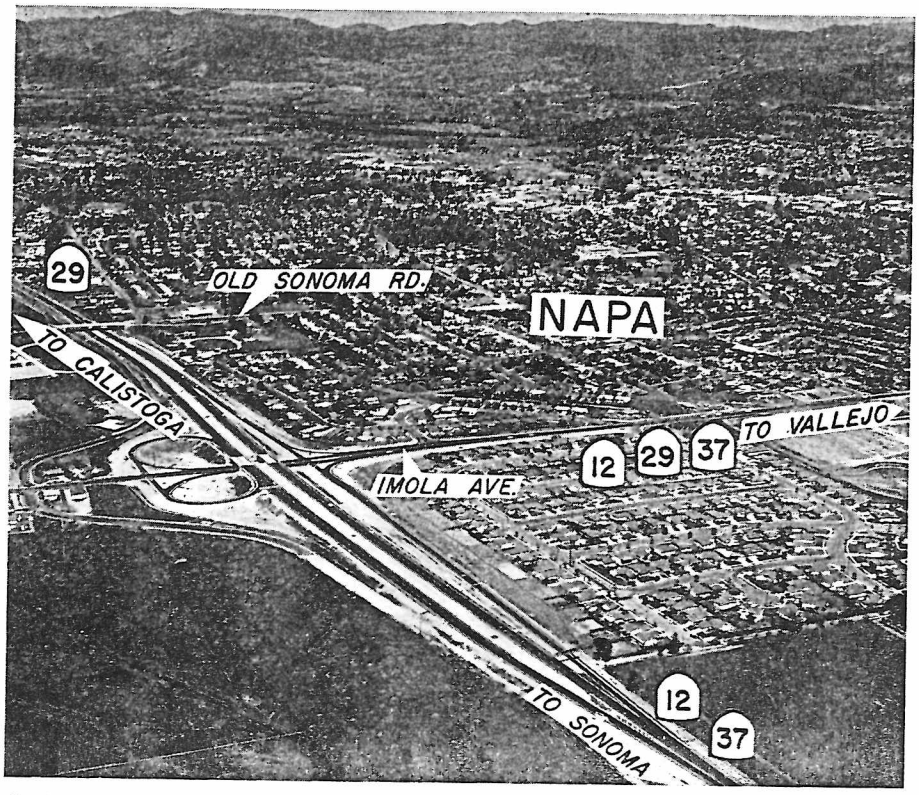


The first unit of the Napa Freeway was completed recently. Another project is about to be awarded to extend this freeway another mile north, toward Calistoga.

A third contract for the improvement of Sign Route 29 over Mt. St. Helena was completed in July of 1962. This $56,000 project provided three truck turnouts between Calistoga and the Lake county line.

Other Improvements

Present programing proposes the utilization of $50,000 every other year for reconstruction of portions of State Sign Route 128 between Pope Valley Road and the Monticello Dam Road relocation. The third segment of such reconstruction was completed in December of last year.

East of Napa, the contract for the construction of a 26-foot all-paved section at several locations on existing State Sign Route 37 between Wooden Valley Road and Sign Route 128 was completed on January 31, 1963. This work cost approximately $152,800 and was constructed by Reichhold & Jurkovich. In order to avoid an area in which repeated slip-outs have occurred, 0.2 mile of Sign Route 37 was realigned approximately 21 miles northeast of Napa, at a cost of approximately $38,000.

SAN FRANCISCO COUNTY

Three contracts are currently underway for the completion of the Southern Freeway within the City and County of San Francisco. In addition, funds have been budgeted for the first unit of the Junipero Serra Freeway (Interstate 280) in Daly City which will include a connection to the Southern Freeway in the vicinity of Orizaba Avenue. Work has also been started on the first unit of the Southern-Embarcadero Extension Freeway and funds are budgeted for an additional section.

Southern Freeway

The first usable project on the Southern Freeway, between Milton Street and the interchange with the James Lick (Bayshore) Freeway is expected to be opened to traffic late this year. The $4,273,000 project is being constructed by Charles L. Harney, Inc., as are the other two units currently under construction. When completed it will provide 4.7 miles of six-lane (ultimate eight-lane) freeway. Two major overcrossing structures serving local traffic to and from Alemany Boulevard are included, as well as overcrossings for Mission Street, Justin Drive and a pedestrian bridge near Gladstone Drive.

The second contract consists of grading and paving for a six-lane freeway, constructing 13 traffic separations, pedestrian crossings and interchange structures and 9 retaining walls. Overcrossings are being constructed at Paulding Street and Baden Street and pedestrian overcrossings will be provided at Theresa Street and Lamartine Street. The remaining nine structures will be overcrossings and undercrossings in the vicinity of San Jose Avenue, to furnish traffic service to San Jose Avenue, Monterey Boulevard, Bosworth Street and Lyell Street. A sum of $6,080,000 has been allotted for this contract.

The above project will not be usable for traffic until the third unit between Ocean Avenue and Orizaba Avenue has been completed, in the summer of 1964. Interchange facilities will be constructed at Ocean Avenue and ramps will be provided for traffic to and from San Jose Avenue in the vicinity of Plymouth Avenue on this $4,581,000 project. Major structures include overcrossings for San Jose Avenue in the vicinity of Broad Street and Mount Vernon, Geneva and Ocean Avenues. Overcrossing structures will be constructed for the freeway and ramps at San Jose Avenue and Sickles Avenue, and pedestrian overcrossings are being provided at Whipple Avenue and Havelock Street.

Also included in the work is construction of bus stop facilities at Ocean Avenue to permit passengers from express buses on the freeway to transfer to local buses on Geneva and Ocean Avenues.

As each construction phase on the Southern Freeway is completed, it is planned to landscape that project. Funds in the amount of $110,000 have been included in the 1963-64 budget for one of these projects to landscape

the first section between Alemany Interchange and Milton Street.

Funds in the amount of $10,000,000 have been included in the 1963-64 budget for a project which combines the completion of the Southern Freeway with the beginning of the Junipero Serra Freeway (Interstate 280) in San Mateo County. (For a discussion of this project, see San Mateo County.)

Embarcadero Extension

Construction is currently underway on the construction of the double-deck viaduct between James Lick Memorial Freeway and Newcomb Avenue. This project is being constructed by Peter Kiewit Sons Co. and costs approximately $3,613,000.

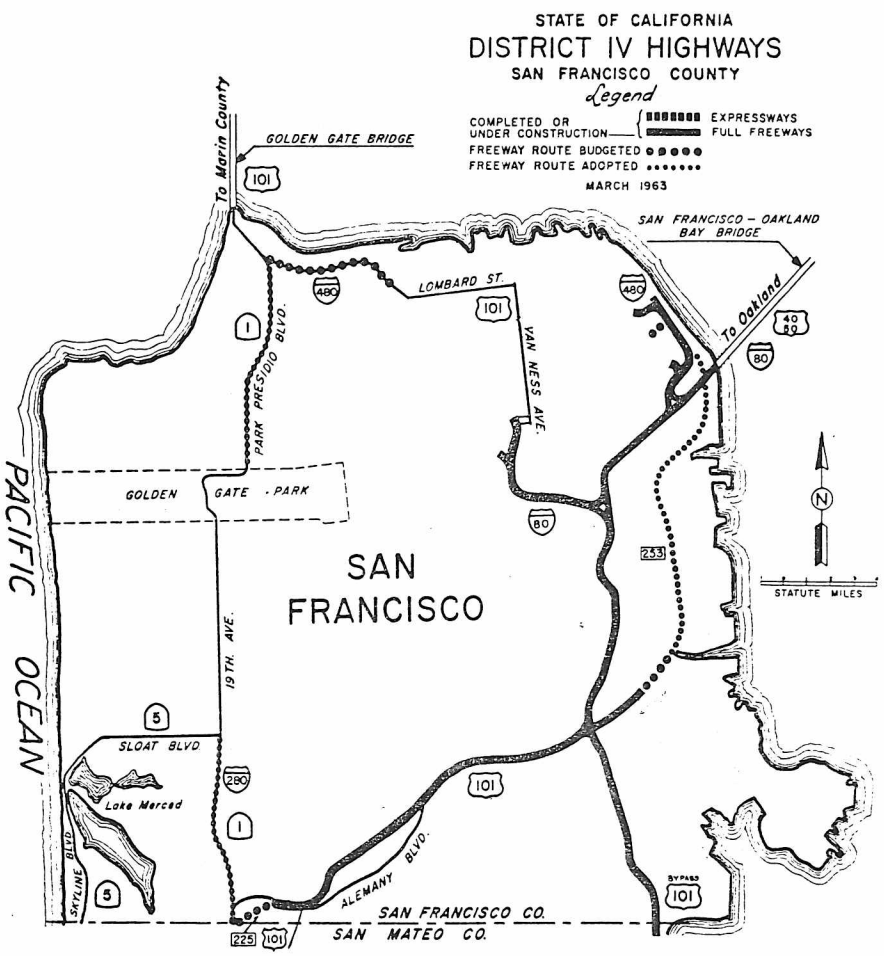
It will not be usable until the second unit, from Newcomb Avenue to Army Street, is constructed. Funds in the amount of $5,580,000 have been budgeted for this work and it should be advertised this summer. The ramp connections which will be provided from Evans Avenue to Army Street, as a part of this latter unit, are an integral part of the future Islais Creek Interchange. The second unit will provide a transition from the double-deck viaduct to a single-deck viaduct.

The remainder of the route has been adopted by the California Highway Commission and when complete, this freeway will provide much needed relief to the Bayshore Freeway northerly of its interchange with the Southern Freeway.

Embarcadero Freeway

In February, J. C. Johnson was awarded a $50,000 landscaping contract for a project between First and Steuart Streets. Approximately 137 trees, mostly eucalyptus, and over 8,000 shrubs are to be planted on this job.

A project for the construction of the Clay-Washington Street ramps to the Embarcadero Freeway is tentatively scheduled for this fall. $1,350,000 has been included in the budget for this work which will provide direct access to the Golden Gate redevelopment area. Advertising is dependent on removal of the remainder



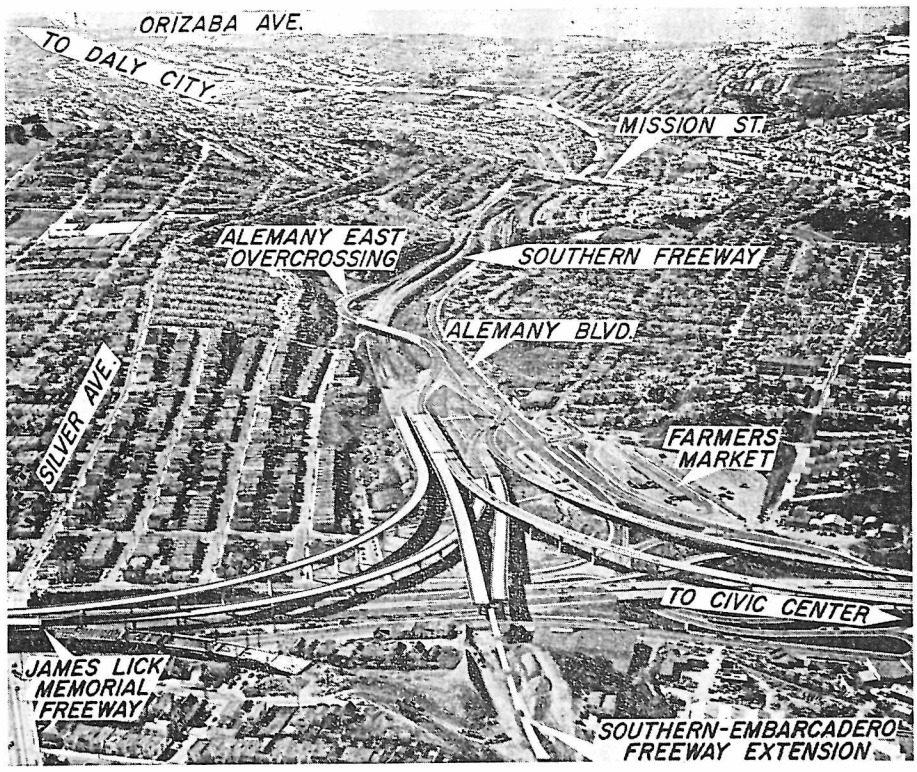


PHOTO RIGHT. Construction work on the Southern Freeway and the Southern-Embarcadero Freeway extension viewed westerly from vicinity of Alemany Boulevard. Four separate contracts are in progress.

of the Wholesale Produce Market to the new Islais Creek site.

U.S. 101 Improvements

A sum of $357,000 was expended for the resurfacing of Bayshore Freeway between 0.3 mile north of Butler Road in South San Francisco and 0.2 mile south of Third Street in San Francisco. This work was completed in November of 1962 by Pacific Pavement Company Ltd. The high volume of traffic on this route necessitated night paving and the detouring of alternate directions of traffic to old Bayshore Highway between the hours of 8 p.m. and 6 a.m.

In July of 1962, a contract for the modification of Army Street northbound offramp and the installation of sign lighting was completed at a cost of $29,000. Additional work on this facility included the installation of chain link mesh covering and railing fences on overcrossings at five locations between Silver Avenue and 18th Street.

Funds in the amount of $5,100,000 have been budgeted for the construction of additional lanes and a median on the Golden Gate Bridge approach between Lyon Street and State Sign Route 1. This project includes the revision of the interchange at Sign Route 1. Within these limits, a contract was completed in November of 1962 for cleaning and painting the Presidio Viaduct between Marina Viaduct and the approach to the Golden Gate Bridge. This work cost approximately $178,000.

SAN MATEO COUNTY

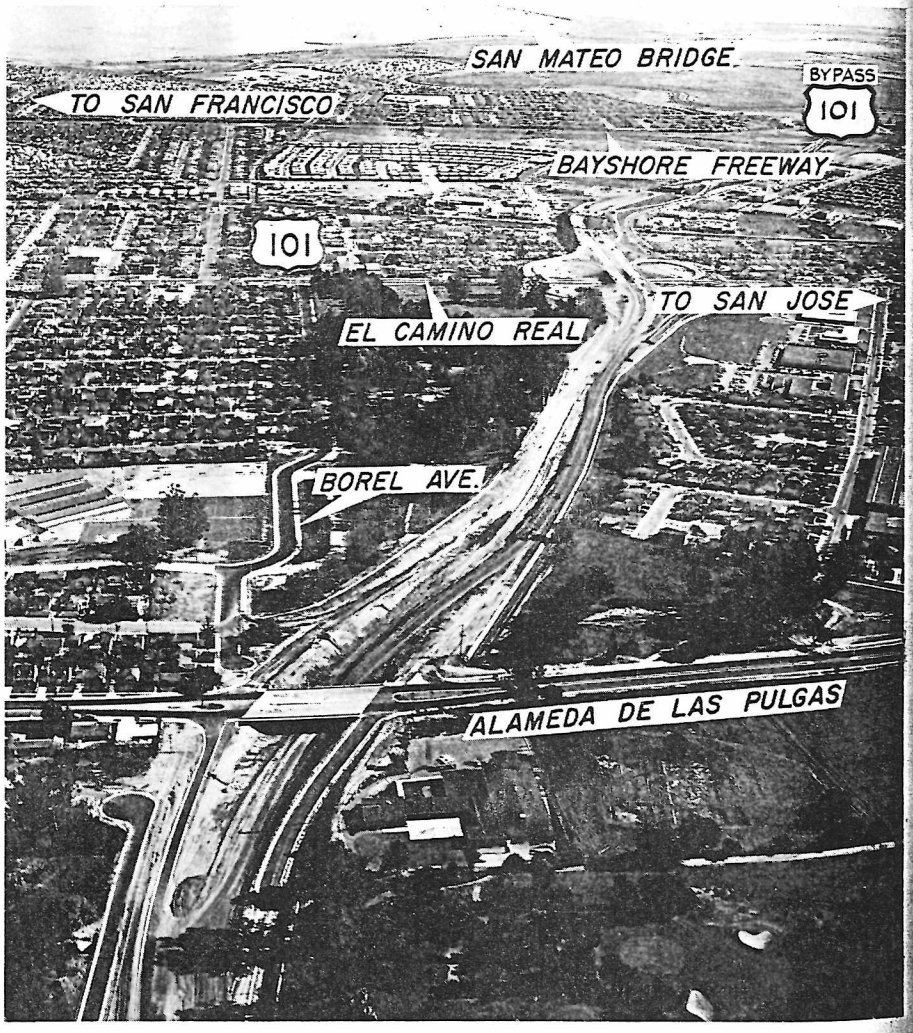
The first steps toward meeting the growing need for high-standard north-south arteries through the central, hilly portion and along the ocean coast were taken this year with the budgeting of funds for freeway projects on Junipero Serra and the Cabrillo Highway. In addition, major improvements are currently in progress on El Camino Real, as well as on the east-west connection in the City of San Mateo, the 19th Avenue Freeway.

19th Avenue Freeway

A $4,652,000 project is currently in progress as the first unit of this freeway which will eventually extend from Half Moon Bay to Hayward via the San Mateo-Hayward Bridge. Extending 2.6 miles between West Hillsdale Boulevard and South Delaware Street, this unit will provide access to the new campus of the College of San Mateo.

Four lanes are under construction between West Hillsdale Boulevard and El Camino Real while easterly of El Camino a six-lane freeway is being built. Traffic separation structures and interchanges are being built at Alameda de las Pulgas, El Camino Real (U.S. 101) and South Delaware Street. This contract also includes an overhead crossing of the Southern Pacific railroad near Pacific Boulevard and an undercrossing at Palm Avenue. L. C. Smith and Concar Ranch and Enterprises are the contractors on this joint venture.

A sum of $225,000 has been included in the 1963-64 budget for landscaping the above work when it is completed late this summer. In December the California Highway Commission adopted a portion of this route westerly of the Junipero Serra Freeway between the latter facility and State Sign Route 5 on Cahill Ridge near Mountain House.



Construction progress on the 19th Avenue Freeway in San Mateo viewed easterly from Alameda de las Pulgas.

Route Renumbering

New Green Markers Will Replace Old Shields

New white-on-green route markers are replacing the familiar black and white shields along some of California's state highways.

Fewer than 50 routes will be affected in the immediate future, although a general renumbering of state highways has taken place in accordance with legislation (Senate Bill 64, Collier) that became effective on September 20, 1963. Where possible, state highways have retained their posted numbers, so that many existing black-on-white markers will remain in place for a while.

Confusion Possible

Some confusion on the part of drivers traveling reposted roads is expected for the next several months. The primary reason is the fact that automobile clubs and the commercial mapmakers, whose products are dispensed by oil companies and others, could not note the new route numbers on maps printed prior to this time. Maps being prepared now will coincide with the new signs.

Another source of possible confusion stems from the fact that the federal government has designated some highways in California by numbers already in use by the State. The State immediately changed its numbers to avoid duplication. Again, maps now on drawing boards will note the changes.

Spade Design Retained

The new markers, like the old sign route shields, are in the shape of the spade used in the gold fields by California's 49er miners. Designed to last for many years, they are cut from aluminum. Their white numerals and translucent green background are developed through a reverse screening procedure. The combination is designed to retain a high degree of visibility at night and in hazy weather.

The colors were decided upon after a panel of engineers had checked various color combinations in over-the-road tests. Blue and gold were strong contenders but lost out when it was discovered the gold had a tendency to appear muddy at night while the white and green retained their true hues.

With the advent of the white-on-green signs some long-familiar numbered routes are being lengthened (Route 1's southern terminus will be Capistrano Beach, Orange County, instead of Las Cruces, Santa Barbara County); some are being shortened (Route 99's new temporary terminus will be Los Angeles instead of the Mexican border at Calexico); and some will be eliminated (U.S. 399).

History of Route Markers

The black-and-white color combination was first adopted by the federal government in 1926 but the first route markers did not appear along California highways until January 1928. However, the Division of Highways was not assigned responsibility for signing highways until 1934, and during the intervening six years two major automobile clubs carried out the program at their own expense.

The California State Automobile Association placed signs in the 45 northern counties, and the Automobile Club of Southern California provided similar service in the 13 southern counties. This work was undertaken along U.S. highways, state highways, county roads and city streets.

The first road to be marked in the north was U.S. 40 from Berkeley to the Nevada state line. In the south, U.S. 101 from Los Angeles to San Diego was marked at the same time. The black-on-white signs were rectangular in shape.

A short time after the automobile clubs began installing signs, the American Association of Highway Officials published the *Manual on Uniform Traffic Control Devices*. The manual established standards in the marking and positioning of U.S. route markers. When the Division of Highways undertook the responsibility of signing highways, it was decided to examine the routes signed by the auto clubs and bring their signing to conformance with AASHO standards.

Because U.S. highway markers were not appropriate for marking state routes, Division of Highways engineers met with representatives of the two automobile clubs to adopt a route marker for state highways. After examining a wide range of suggested designs, the group selected the "bear shield" which resembled a miner's spade and displayed a grizzly bear taken from the California Bear Flag.

Numbering Systems Vary

As the state highway network grew and existing roads became longer, each new segment was given its own number by the Legislature then in session. As a result, some state highways acquired as many as 13 different legislative route numbers along the way. To minimize these complications for the motorist, the Division of Highways established the state sign route system that identified each road from one end to the other by a single number. This system supplemented the U.S. shield numbers which are assigned by the federal government on the recommendation of AASHO.

The new system parallels the sign route method in that one road calls for only one number when possible.

Sign Installation Schedule

Some of the new route signs are already in place, and Division of Highways plans call for almost all those which will identify the renumbered highways to be installed by July 1, 1964.

More signs will be posted during the next two or three years. Damage and age will necessitate future replacement of present black-on-white markers. And where highway construction is underway or will begin in the near future, state officials believe it impractical to post new signs along a right-of-way until construction is nearly complete.

Another important facet of the operation is the removal of black-and-white shields. In the past, portions

of many California highways have been marked with the shields of multiple routes because those particular stretches were incorporated into a combination of two or more state and federal highways. This practice, which complicated travel for unwary drivers unacquainted with the procedure, will almost be eliminated when the "one number equals one highway" project is complete.

Interstate Route Signs Differ

Routes that make up the California portion of the National System of Interstate and Defense Highways are locations where the new numbers will receive a prominent display but on red, white and blue shields instead of white on green. Typical examples are Interstate Route 80 between San Francisco and Reno (formerly U.S. 40), and Interstate Route 10 between Los Angeles and Indio (formerly U.S. 70, 99, and portions of 60).

These multilane full freeways and other interstate routes will proclaim their route numbers in red, white and blue on route signs that resemble the federal shield. The variations in color and design will make any road that is part of the national interstate system easy to identify as such.

Not all the black-on-white federal shields will disappear from national highways in California, for the red, white and blue shields will mark only interstate routes. Those U.S. highways (U.S. 101, for example) which are not included in the national interstate system will retain their present black-on-white shields.

Nor will the blue-and-gold shields that identify county roads by letter and number be eliminated. The county networks were not included in the 1963 legislative act and therefore will retain their present identities and shields.

Renumbered State Highways

The following list includes all California state highways where new signs will be posted over any portion of their length prior to July 1, 1964.

Route 1—742 miles, from Interstate Route 5 at Capistrano Beach, Orange County, via San Luis Obispo, San Francisco and Jenner to Fernbridge, Humboldt County. Incorporates former U.S. 101 Alternate from Capistrano Beach, Orange County, to north of Oxnard, Ventura County.

Route 2—89 miles, from Route 1 in Santa Monica to Route 138 near Cajon (north of San Bernardino). Incorporates portion of former U.S. 66 between Santa Monica and Pasadena.

Route 4—209 miles, from Interstate Route 80 near Hercules, Contra Costa County, via Angels Camp, Calaveras County, to Route 89 at Woodfords, Alpine County. Incorporates former Route 24 from Concord, Contra Costa County, to Antioch Bridge, Contra Costa County.

Route 7—33 miles, from Route 11 (Harbor Freeway) in San Pedro, Los Angeles County, to Interstate Route 210 in Pasadena. Incorporates former Route 15 for length of Long Beach Freeway.

Route 11 (Harbor and Pasadena Freeways)—33 miles, from San Pedro, Los Angeles County, to Route 248 in Pasadena. Incorporates former U.S. 6 from San Pedro to Los Angeles and former U.S. 66 from Los Angeles to Pasadena.

Route 14—141 miles, from Route 1 northwest of Santa Monica to Route 395 near Inyokern, Kern County. Incorporates Antelope Valley Freeway and former U.S. 6 from junction with Route 395 at Tunnel Station (north of San Fernando, Los Angeles County) to near Inyokern. (Santa Monica to Tunnel Station not yet constructed.)

Route 26—56 miles, from Route 99 near Stockton to West Point, Calaveras County. Incorporates former Route 8 from near Stockton to Mokelumne Hill.

Route 29—107 miles, from Interstate Route 80 near Vallejo, via Calistoga, Napa County, to Route 20 near Upper Lake, Lake County. Incorporates former Route 53 from Middletown to Lower Lake, Lake County.

Route 33—315 miles, from Route 101 near Venture via Coalinga, Fresno County, to Interstate Route 205 near Tracy, San Joaquin County. Incorporates former U.S. 399 from Ventura to Taft, Kern County.

Route 35—52 miles, from Route 17 near Holy City (Santa Cruz–Santa Clara county lines to Route 280 in San Francisco). Incorporates former Route 5 from Saratoga Gap, Santa Clara County, to San Francisco.

Route 37—32 miles, from Route 17 near Nicasio, Marin County, to Interstate Route 80 north of Vallejo, Solano County. Incorporates former Route 48 from junction with Route 37 at Sears Point, Sonoma County, to junction with Interstate Route 80. (Novato to Nicasio not yet constructed.)

Route 38—59 miles, from Interstate Route 10 near Redlands, San Bernardino County, to Route 18 at west end of Big Bear Lake, San Bernardino County. Incorporates former portion of Route 18 from west end of Big Bear Lake to Big Bear City.

Route 41—188 miles, from Route 1 near Morro Bay, San Luis Obispo County, via Fresno to the south boundary of Yosemite National Park. Incorporates portion of U.S. 466 from near Morro Bay to Atascadero, San Luis Obispo County. (See Route 46.)

Route 46—119 miles, from Route 1 at Cambria, San Luis Obispo County, to Route 99 at Famosa north of Bakersfield. Incorporates portion of U.S. 466 from point near Shandon, San Luis Obispo County, to Famosa. (See Route 41.)

Route 58—240 miles, from Santa Margarita, San Luis Obispo County, via Bakersfield, to Interstate Route 15 near Barstow, San Bernardino County. Incorporates portion of U.S. 466 from point near Bakersfield to Barstow.

Route 69—44 miles, from junction with Route 198 (near Exeter), Tulare County, to Sequoia National Park (north of Badger). Replaces Route 65.

Route 70—182 miles, from Route 99 (about 4 miles southeast of Nicolaus), Sutter County, to Route 395 near Hallelujah Junction, Lassen County. Incorporates former Route 24 from near Sacramento to Marysville and U.S. 40 Alternate from Marysville to Hallelujah Junction.

Route 82 (El Camino Real)—57 miles, from Route 101 at Ford Road (south of San Jose), Santa Clara County, to San Francisco. Incorporates former portion of U.S. 101 from Ford Road to San Francisco.

Route 86—89 miles, from junction with Route 111 (east of Heber), Imperial County, to junction with Route 10 near Indio, Riverside County. In-

corporates former portion of U.S. 99 from near Heber to near Indio.

Route 91—63 miles, from Route 1 near Hermosa Beach, Los Angeles County, to Route 395 near Riverside, Riverside County. Incorporates former Route 14 from Hermosa Beach to Route 5, former portion U.S. 91 from near Route 5 to Route 395.

Route 111—129 miles, from Mexican border at Calexico, Imperial County, to Interstate Route 10 near Whitewater, Riverside County. Incorporates former portion of U.S. 99 from east of Heber, Imperial County, to Calexico, Imperial County.

Route 113—60 miles, from Route 12 northwest of Rio Vista, Solano County, to Route 99 south of Yuba City, Sutter County. Incorporates former U.S. 40 Alternate from Interstate Route 80 near Davis, Yolo County, to south of Yuba City.

Route 116—47 miles, from Route 1 near Jenner, Sonoma County, to Route 121 near Schellville, Sonoma County. Incorporates former portion of Route 12 from Jenner to Schellville.

Route 119—34 miles, from Route 33 in Taft, Kern County, to Route 99 at Greenfield, Kern County. Incorporates former portion of U.S. 399 from Taft to Greenfield.

Route 121—34 miles, from Route 37, Sonoma County, to Route 128 north of Napa, Napa County. Incorporates Route 37 from junction with Route 48 at Sears Point to junction with Route 128 north of Napa.

Route 138—113 miles, from Interstate Route 5 near Gorman, Los Angeles County, to Route 18 near Crestline, San Bernardino County. Incorporates former portion of Route 2 from its junction with Route 138 east of Wrightwood to junction with Route 18 near Crestline.

Route 154—32 miles, from Route 101 near Buellton, Santa Barbara County, via San Marcos Pass, to Route 101 near Santa Barbara. Incorporates former portion of Route 150 from Santa Ynez to Route 101 near Santa Barbara.

Route 160 (River Road)—61 miles, from Route 4 near Antioch, Contra Costa County, to Interstate Route 80 near Sacramento. Incorporates former portion of Route 24 from Antioch to near Sacramento.

Route 175—38 miles, from Route 101 near Hopland, Mendocino County, to Route 29 near Middletown, Lake County. Incorporates former portion of Route 29 from Middletown, via Hobergs, to 5 miles south of Kelseyville.

Route 246—35 miles, from Surf, Santa Barbara County, to Route 154 near Santa Ynez, Santa Barbara County. Incorporates former portion of Route 154 from Surf to near Santa Ynez.

Route 299—307 miles, from Route 101 near Arcata, Humboldt County, to Nevada state line near Cedarville, Modoc County. Extends former U.S. 299 for 43 miles from Cedarville to the junction with Route 395 at Alturas, Modoc County.

ILLUMINATED SIGNS WARN OF FOG, LOW VISIBILITY

Signs which can be illuminated to warn motorists to reduce their speed to variable maximums at times of limited visibility, such as fog, have been installed at a test site on the Elvas Freeway (U.S. 99E) in Sacramento.

Ultimately, six signs on this freeway segment between Arden Way and south of the American River Bridge will be used to carry out part of the intent of Senate Resolution No. 33 (1963 session).

In this resolution, the Highway Transportation Agency was asked to initiate a "study which will determine possible means of giving advance warning to drivers of motor vehicles of the need for greater alertness and caution when driving during periods of reduced visibility." A report of survey findings will be submitted to the Legislature early in 1965.

The signs, electrically powered and comparable to the familiar time and temperature signs, will be in effect whenever weather conditions warrant reduced speed limits. Traffic engineers from the State Division of Highways will operate the signs in cooperation with the California Highway Patrol, and in turn survey their effectiveness in alerting the public to special hazards ahead.

The Senate resolution was enacted in an attempt to cope with accident statistics. Approximately 3 percent of automobile accidents in 1961 were attributed to conditions of reduced visibility. Moreover, 14 percent of 1961 accidents involving four or more cars happened under like conditions, and 1962 statistics showed that such accidents were increasing.

Variable speed signs are only one of the methods to be tested. Other devices and techniques being studied include increased patrol activity, concentrated public information dissemination, use of reflective wedge-shaped pavement markers, use of white shoulder stripings, and use of colored reflective shoulder and lane striping at on- and off-ramp locations.

State agencies involved in the study project are the Division of Highways, the California Highway Patrol, the Department of Motor Vehicles, and the Institute of Transportation and Traffic Engineering at the University of California's Richmond field office. The latter institution has made available their fog chamber for evaluating devices to be used in the study.

Hveem, Zube, Skog Win Emmons Award

Three Division of Highways engineers were recipients of the W. J. Emmons Award of the Association of Asphalt Paving Technologists.

They are F. N. Hveem, recently retired chief of the Materials and Research Department, Ernest Zube, supervising materials and research engineer, and John B. Skog, senior materials and research engineer.

The award was for the best paper presented at the 1963 meeting which was held in San Francisco.

Title of their paper was "Proposed New Tests and Specifications for Paving Grade Asphalts."

Zube and Skog also received honorable mention for a second paper presented at the same meeting.

Bay Area Report—1964

By J. P. Sinclair, District Engineer

Planning the "freeways of the future" is probably the single most impressive development applying to highway construction in the San Francisco Bay area that has come to light in the last year.

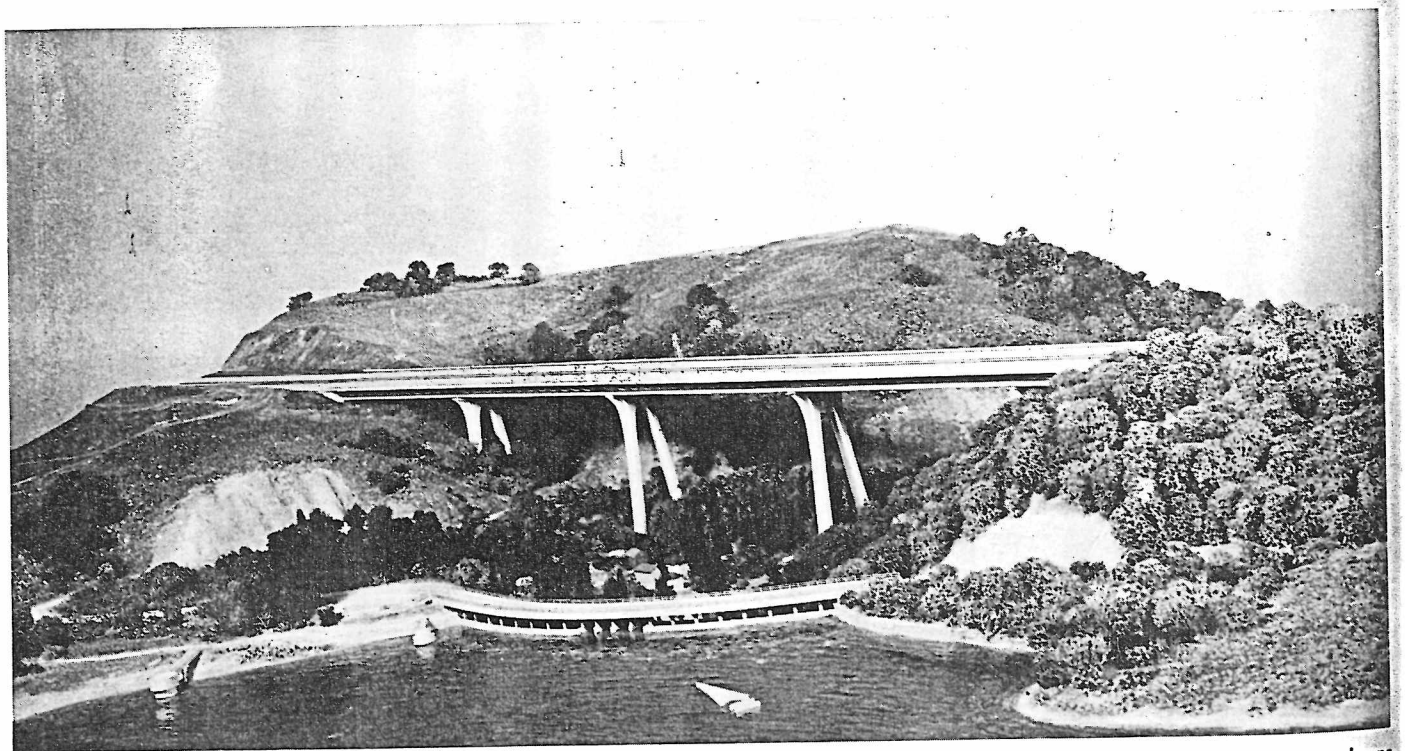
Increased emphasis is being placed on efforts to make freeways and structures more aesthetically pleasing and to blend the highways into the landscapes of the areas through which they pass, with due consideration given to the protection of both social and economic values by both state and local agencies.

The Design Department is meeting this emphasis by the addition of such features as contour-graded interchanges and increased attention to the impact of drainage and other structures on the appearance of the highways.

Editor's Note: This report was prepared shortly before Mr. Sinclair's death on May 24, 1964. For a summary of his career, see p. 69.

The Division of Highways has retained several prominent consulting architects and has worked with them in the development of pleasing aesthetic designs for sections of freeway and for structures in certain locations.

One such location is the future Interstate 280 (Junipero Serra) Freeway. Considerable time was spent working with the noted San Francisco architect Mario J. Ciampi, in the development of designs for the structures in the first contract of this freeway. By combining some aspects of the aesthetic treatment proposed by the architect with economic structural requirements, a design has resulted which will bring many new and pleasing features to the more than 70 structures which will be built on this scenic freeway. This new look will include such items as curved edges on the bridge superstructure to create an illusion of thinness, variety in form and appearance of the supporting piers, and the extension of the bridge railing to dispense with the need for metal guard railing at the bridge ends. The liberal use of curved and oblique surfaces will soften the lines and enable the structures to better blend with the surrounding areas. Those structures which cross over the freeway will be prestressed in order to



This is a Bridge Department model of the proposed eight-lane bridge over San Mateo Creek on Interstate Route 280. Note the graceful concrete columns supporting the slim steel roadway which blends into the surrounding area. Crystal Springs Dam is shown in the foreground.


CLOVERDALE
GEYSERVILLE
HEALDSBURG
CALISTOGA
S O N O M A
N A P A
ST. HELENA
SANTA ROSA
SONOMA
NAPA
PETALUMA
M A R I N
NOVATO
VALLEJO
SAN RAFAEL
MARTINEZ
ANTIOCH
CONCORD
RICHMOND
CONTRA COSTA
OAKLAND
SAN FRANCISCO
HAYWARD
ALAMEDA
SAN BRUNO
PACIFICA
SAN MATEO
SAN JOSE
LOS GATOS
SANTA CLARA
MORGAN HILL
GILROY
SANTA CRUZ
WATSONVILLE
P A C I F I C
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SAN MATEO
SANTA CRUZ
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Legend
COMPLETED OR UNDER CONSTRUCTION
BUDGETED
FREEWAY ROUTE ADOPTED
STATE OF CALIFORNIA
HIGHWAY TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS
DISTRICT IV
FREEWAYS AND EXPRESSWAYS
464

SAN FRANCISCO COUNTY

In the City and County of San Francisco, freeway construction is almost always in the million-dollar bracket.

Of four contiguous contracts, which, when completed, will provide almost 10 miles of six-lane continuous freeway between the Route 101 interchange in San Francisco and Eastmoor Avenue in Daly City on Routes 82, 1, and 280, one has been completed, two are scheduled for completion in September of this year, and the last started in April of 1964.

Route 82

A section of six-lane (ultimate eight-lane) freeway opened to traffic on October 18, 1963. The $4,273,000 project, which was built by Charles L. Harney, Inc., runs between the interchange with James Lick (Bayshore) Freeway and Milton Street. The job included extensive relocation of Alemany Boulevard through the existing natural corridor to accommodate the freeway facilities and construction of two major overcrossing structures to serve local traffic, as well as other facilities.

East of Route 101, the James Lick Freeway, work was completed on February 14, 1964, on the two-level viaduct on Route 82 between the Route 82 101 interchange and Newcomb Avenue. This $4,100,000 project, which was built by Peter Kiewit Sons' Company, will not be usable until the next unit, extending to Army Street, is constructed.

Bids will be opened on May 20, 1964, for the construction of this extension. Within this portion, between Newcomb Avenue and Army Street, the structure will gradually change from a double-deck to a single-deck viaduct in the vicinity of Evans Avenue. Ramp connections on this project, for which $6,100,000 has been budgeted, are an integral part of the future Islais Creek Interchange at the junction of Routes 82 and 87.

The remainder of the route has been adopted by the California Highway Commission. When complete, this freeway will provide much needed relief to Route 101 northerly of its interchange with Route 82.

Projects Under Construction

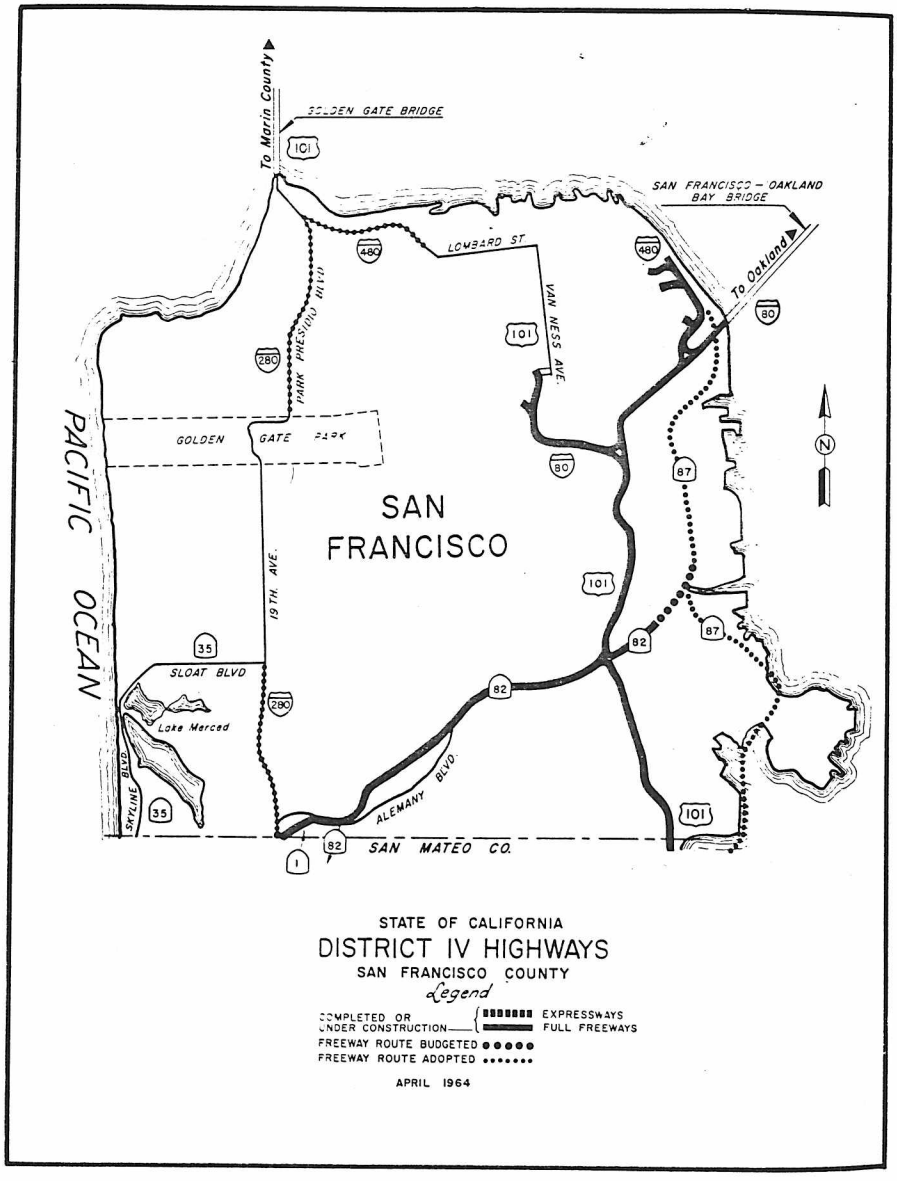
Two projects are currently under way to complete Route 82 between the James Lick Freeway and Orizaba Avenue near the south city limits of San Francisco.

The first is a $6,080,000 project for the construction of 1.1 miles of six-lane freeway between Mission Street and Ocean Avenue. It includes the construction of 13 traffic separation and interchange structures.

Traffic will not be able to use this unit until after the adjacent section, that between Ocean and Orizaba Avenue, has been completed.

Both projects, which are being built by Charles L. Harney, are scheduled to be finished this fall.

The unit between Ocean and Orizaba runs for 1.8 miles. This job, which is being built at a cost of $4,581,000, includes the construction of an interchange at Ocean Avenue and a number of access ramps, overcrossings, and other traffic separation structures.



An unusual feature of this job is the construction of bus stop facilities at Ocean Avenue to permit passengers from express buses on the freeway to transfer to local buses on Geneva and Ocean Avenues.

Landscaping

As each construction phase on Route 82 is completed, landscaping will follow. Plans for landscaping that portion of Route 82 between Route 101 and Milton Street are complete. The sum of $110,000 has been budgeted and bids will be received on June 3.

Design studies are underway for landscaping the one-mile section between Havelock and Mission Streets when the freeway construction within these limits has been completed. The 1964–65 construction budget contains $75,000 for this purpose.

A project for landscaping that section of Route 82 between Orizaba and Ocean Avenues, currently under construction, will be included in a future budget.

Route 87

Freeway agreements have been executed for the portion of Route 87 between Evans Avenue and Sixth and Brannan Streets, which will eventually be a six- and eight-lane freeway. Design studies are now in progress, and the portion between Evans Avenue and 18th Street will be built first.

Design studies are being made and preparation of preliminary freeway agreements is under way for the section of Route 87 from Sixth Street to the junction with Interstate 480 in the vicinity of Howard Street.

Route 1

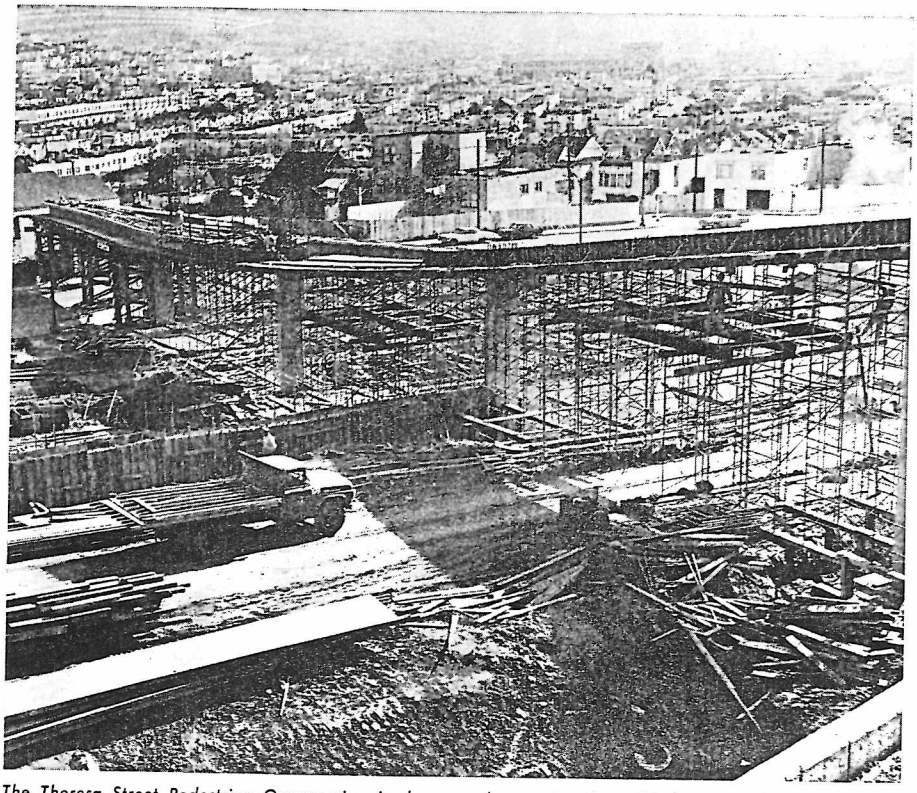
Route 1 is a connection between Route 82 near Orizaba Avenue in San Francisco and Interstate Route 280 in the vicinity of the Alemany Boulevard extension in Daly City.

Work on this route started on April 8, 1964, as a part of a $9,978,000 contract on Interstate Route 280 in the vicinity of Daly City being built by Peter Kiewit Sons' Company. (See San Mateo County.)

The portion of the contract involving Route 1 includes the construction

Aerial photo looks west from the vicinity of Newcomb Street toward the intersection with James Lick (Bayshore) Freeway showing the section of double-deck viaduct that was completed in February. This unit will not be usable until the next section, extending to Army Street, is constructed.

Paving operations along a section of six-lane freeway being built on Route 82 in San Francisco.



The Theresa Street Pedestrian Overcrossing is shown under construction with forms in place for pouring the side railing. The job is on the Ocean Avenue to Mission Street section of Route 82.

View looking east shows grading work in progress for the relocation of San Jose Avenue and falsework for the access ramp from San Jose Avenue on the Mission Street to Ocean Avenue section of Route 82.

of traffic separations at Alemany Boulevard and near St. Charles Avenue, in addition to the freeway connection between Routes 82 and 280.

Route 480

Work started on December 18, 1963, on a $1,443,000 job to grade, pave and build the structures of the Clay and Washington Street ramps connecting Route 480 with the Golden Gateway Redevelopment project.

This job, which is being performed by Stolte, Inc., is due to be finished in December 1964. Work, which includes installation of sign structures, signs, and lighting, is being coordinated with a future city contract for the widening of Clay and Washington Streets and with another city contract, currently underway, for the installation of a city sewer main and pumping station on Drumm Street.

An interesting feature of this job is the driving of 37,000 feet of steel "H" piling, ranging in length from 150 to 210 feet.

Studies have started on the extension of Route 480 between the present end of the freeway at Broadway and the Golden Gate Bridge approaches as requested by the board of supervisors' resolution of October 21, 1963.

Other Routes

A public hearing, attended by some 500 San Franciscans, was held on April 6, 1964, for presentation of studies of several alternates, including variations of some of the alternates, for the Panhandle Parkway and Crosstown Tunnel as requested by the board of supervisors. The California Highway Commission held a public hearing on May 21.

These studies were prepared by the study coordinating committee, composed of state and city officials and aided by noted architectural consultant Lawrence Halprin.

The San Francisco Board of Supervisors has also requested that studies be made for the extension of Route 101 from McAllister and Franklin Streets to Ellis and O'Farrell Streets.

SAN MATEO COUNTY

The freeway story in San Mateo County during the past year is one of going construction and plans for the future in all parts of the county.

The biggest project got underway with the start of construction on the new Interstate Route 280 at the north county limits, but other preliminary work and plans for the future are also very much in progress.

Other important work is taking place on Route 1, the Cabrillo Highway; Route 82, El Camino Real; Route 92; Route 101, the Bayshore Freeway; and on Route 114 in Redwood City.

Interstate Route 280

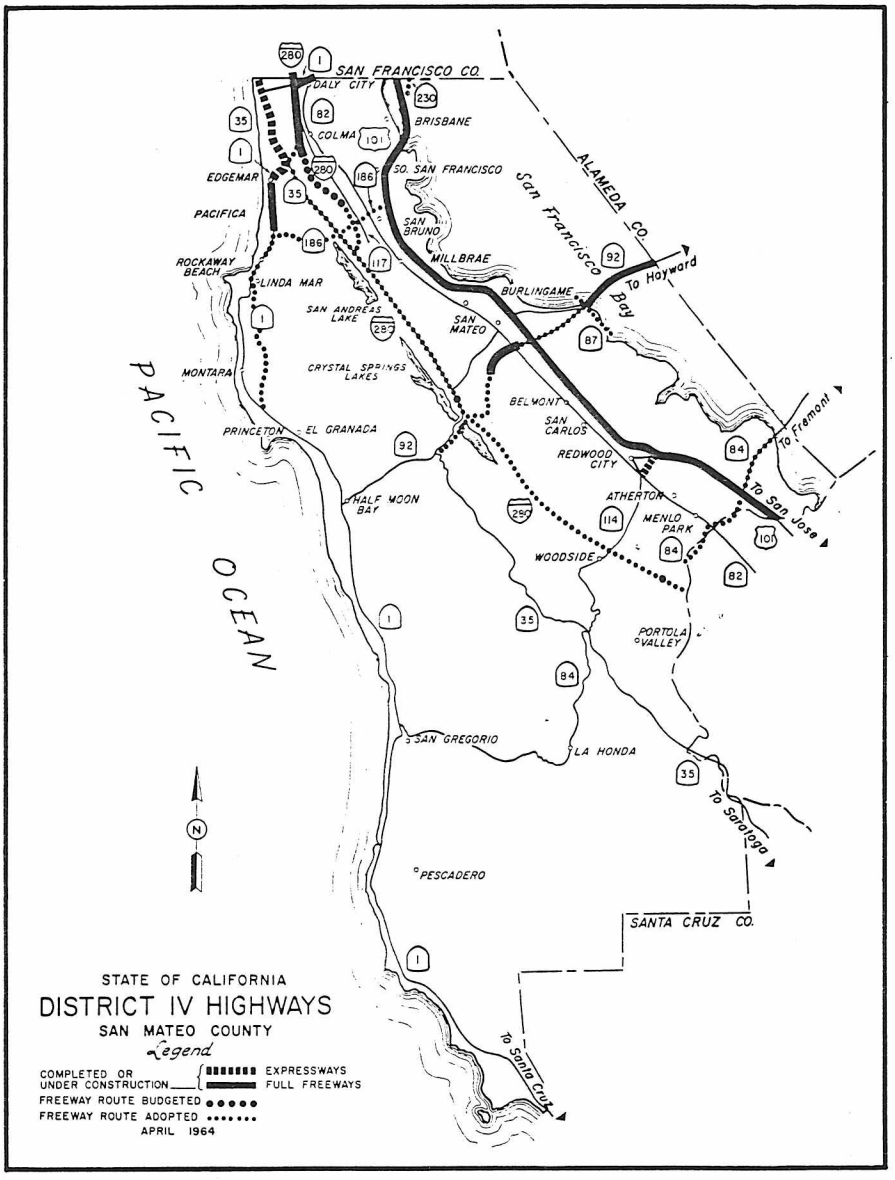
Work started April 8, 1964, on a $9,978,000 job to build approximately four miles of eight- and ten-lane freeway on Routes 1 (see San Francisco County) and 280 between Orizaba Avenue in San Francisco and one-half mile south of Eastmoor Avenue in Daly City.

This work, being performed by Peter Kiewit Sons' Company, includes the construction of 12 grade separations and the modification of the existing Alemany Boulevard overcrossing. Major structural feature of this job will be the construction of a three-level interchange in the vicinity of Knowles Avenue in Daly City to channel traffic satisfactorily to and from San Francisco from two directions—Route 1 and the existing Junipero Serra Boulevard.

The work also includes the realignment of Junipero Serra Boulevard to serve adjacent properties as a frontage road and the construction of other interchanges to provide access to the new Route 280.

Construction on the Route 1 part of the job includes rough grading, drainage, and frontage road facilities westerly of Interstate 280 to Route 35 and construction of the six-lane freeway connection between Route 82 near Orizaba Avenue and Route 280 in San Francisco. (See San Francisco County.)

Preliminary to the freeway construction will be the relocation of storm drains on Junipero Serra Boulevard about one-quarter mile south of Knowles Avenue. The sum of $74,000 has been allocated for this work, which Lowrie Paving Company, Inc., started on March 6, 1964.



Future Projects on 280

Partial financing has been provided in the 1964–65 budget for two separate projects on Route 280 immediately south of the above construction. Some $1,800,000 is included for the extension of the route from Eastmoor Avenue in Daly City to south of Arroyo Drive in South San Francisco. An additional $6,700,000 will be required in the 1965–66 budget to complete it.

The 1964–65 budget also includes partial financing in the amount of $2,500,000 for construction of the proposed eight-lane bridge over San Mateo Creek near Crystal Springs Dam on Interstate Route 280. A model of this bridge was seen by members of the Peninsula Highway Policy Committee on March 11, 1964. (Photo on page 24).

New S. F. Freeway

Four Miles of Route 82 Built on New Alignment

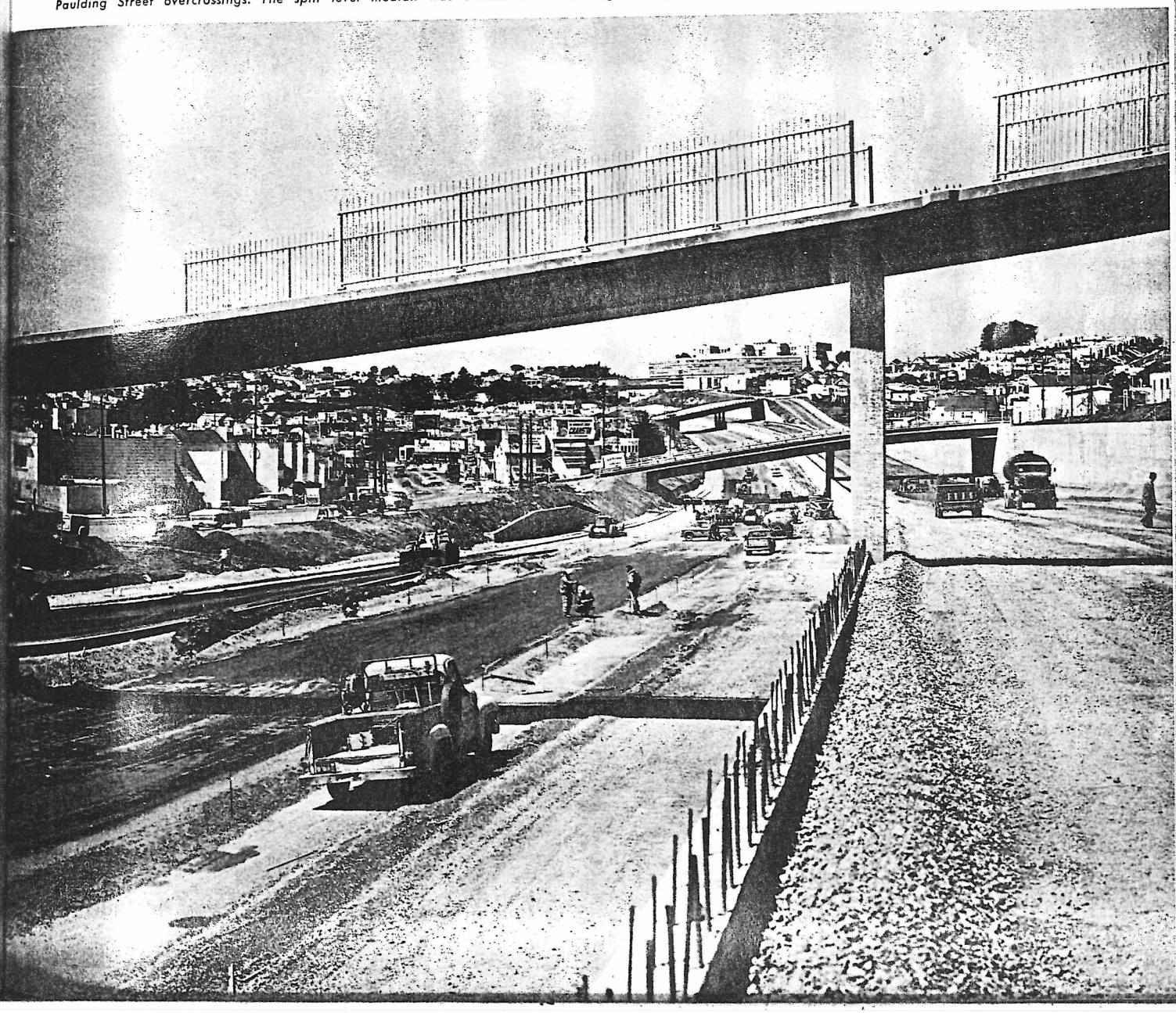
By HAIG AYANIAN, Deputy District Engineer

Early this fall motorists will be able to drive from the southwesterly section of San Francisco to the Bay Bridge and across to the East Bay and beyond *without once using a city street.* This ...er, signal-free driving will be possible as soon as two contracts currently under construction on Route 82, known locally as the "Southern" Freeway, are finished.

The route, built on completely new alignment, is located in the natural traffic corridor serving former US 101, which has followed Alemany Boulevard and San Jose Avenue. It also occupies the old Southern Pacific Railroad right-of-way for almost two-thirds of its length. This was the old "Main Line," built in the 1860's as a rail link between San Francisco and San Jose. Passenger trains stopped using these tracks in 1907 when the bulk of Peninsula train traffic was shifted to the western shores of San Francisco Bay.

More than six years and four major construction projects were required to complete approximately four miles of six- (ultimate eight-) lane freeway from Orizaba Avenue to the Route 82/101 Interchange. The entire job

Looking westerly toward San Francisco City College from the vicinity of Theresa Street pedestrian overcrossing. Also visible are Baden Street and Paulding Street overcrossings. The split level median was utilized to reduce right-of-way requirements and avoid excessive retaining wall height.



was planned as one unit and broken down into four projects for ease of construction. Total cost of construction was $24,000,000 which was almost matched by the $18,000,000 cost of right-of-way acquisition. The City and County of San Francisco contributed $1,800,000 toward the cost of construction and $500,000 toward right-of-way purchases. Route 82 is one of the few major state highways in San Francisco that is not being constructed with Interstate funds.

In City Master Plan

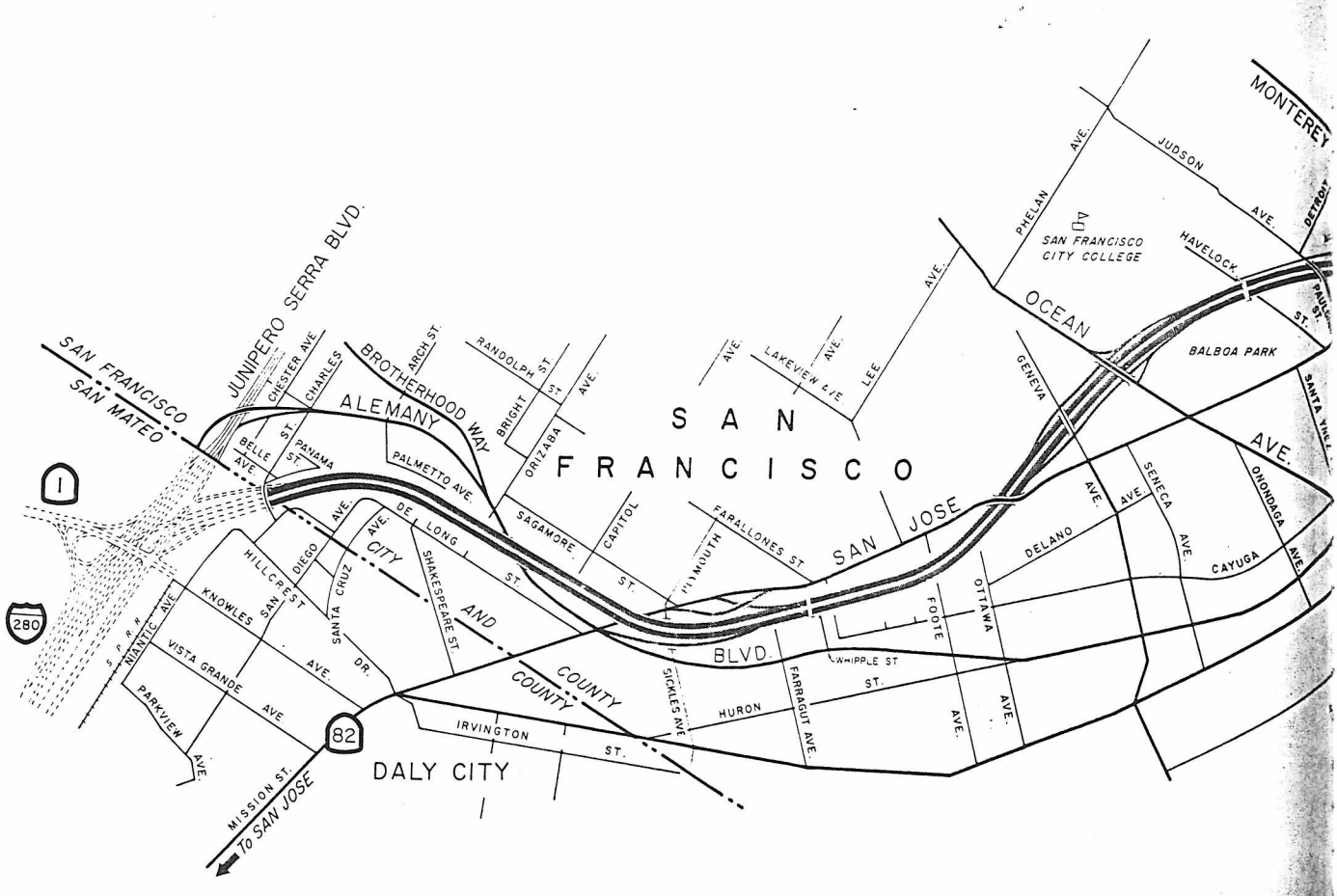
This freeway route was originally conceived by the City of San Francisco and appears on the city's master plan in substantially the same location it now occupies. On June 21, 1956, the California Highway Commission adopted the section between Orizaba Avenue and Route 101 as a freeway route. The freeway agreement with the City and County of San Francisco was executed on August 29, 1956, and revised on July 7, 1958.

A natural trafficway exists in a valley in the southern part of San Francisco running in a southwesterly direction to the San Mateo County line. Historically, all traffic from the residential areas of the western parts of the city and northwestern San Mateo County destined for the downtown and industrial areas of San Francisco has been forced by the topography of the valley to use this natural corridor, through which Alemany Boulevard and San Jose Avenue pass.

When the need for the "Southern" Freeway was being evaluated, it was found that the combined average daily traffic on these routes exceeded 53,000 vehicles. In addition, afternoon peak-hour traffic on the James Lick Freeway (US 101) bound for Alemany Boulevard backed up in such a manner as to block two of the four southbound lanes, resulting in a slowing down, and in many cases a complete stoppage, of traffic in this area.

When the new freeway is opened to traffic, it is expected to carry 50,000 vehicles per day and reduce the traffic load on Alemany Boulevard and San Jose Avenue to 24,000. The new freeway is expected to carry an average daily traffic load of 120,000 to 200,000 by 1985.

MAP BELOW AND OPPOSITE PAGE. The new Route 82 Freeway in San Francisco extends from the Route 101 interchange to Orizaba Avenue.



Construction Problem

The problem of keeping more than 50,000 cars moving through the construction zones each day was the controlling factor on all four contracts. It was solved by a carefully engineered schedule of stage construction to provide for the diversion of traffic to planned detours as each job progressed. Although the detours were only temporary, they were built to structural standards comparable to city streets. In general, the contractor was required to provide full width of traveled way between approximately 4 p.m. and 9 a.m. the following workday morning. At all other times, multilane roadways were reduced by one lane in each direction—but only when and where construction required.

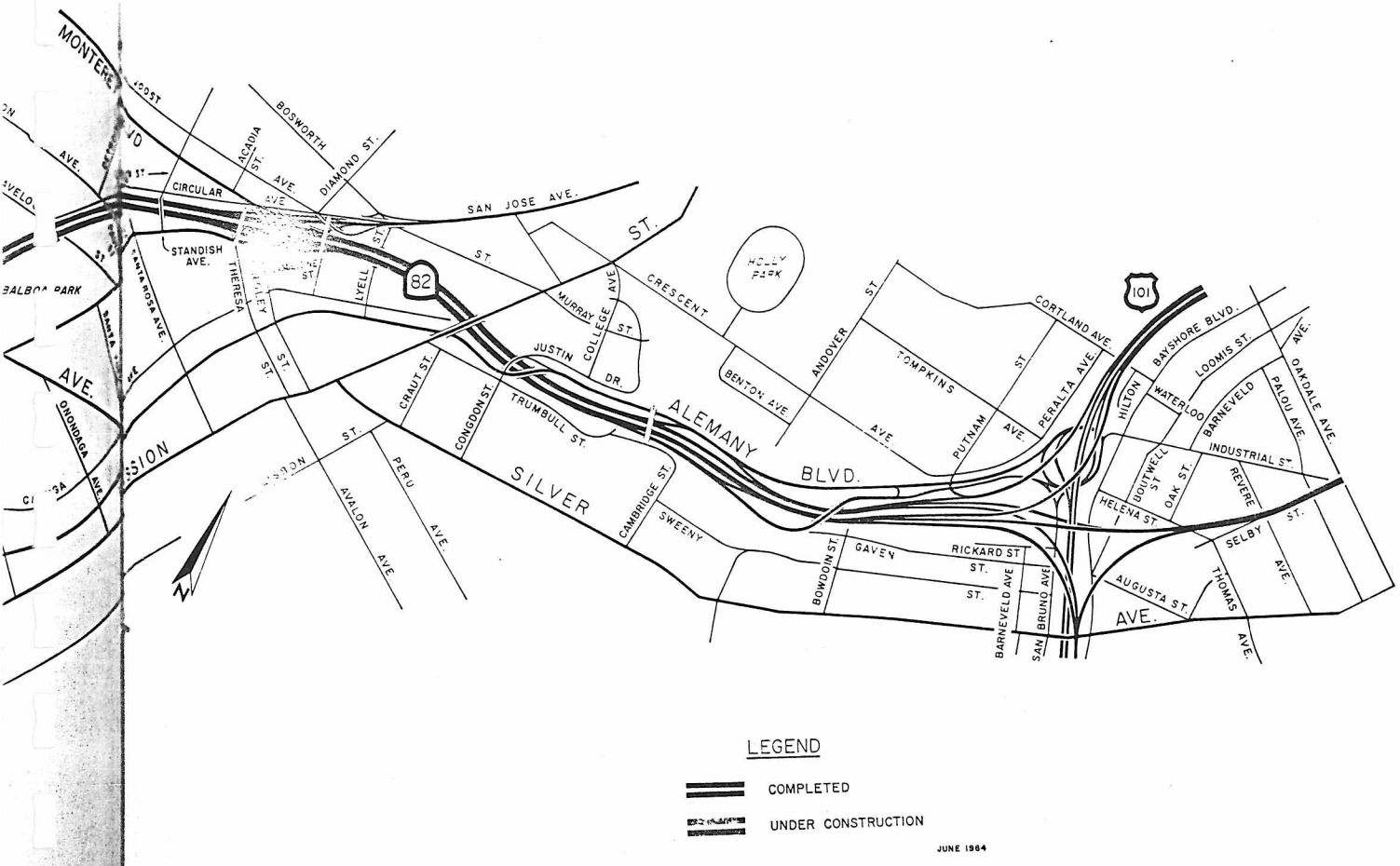
Route 82/101 Interchange

The first step on the construction of the "Southern" Freeway was taken on July 15, 1958, when the Guy F. Atkinson Company began work on a directional interchange between Routes 82 and 101. The work included installation of a prestressed concrete slab bridge at the Bacon Street Undercrossing, widening of the Cortland Avenue Undercrossing, pedestrian undercrossings at Burrows Street and Thornton Avenue, 1,600 lineal feet of retaining walls, and rough grading and excavation only for 0.6 mile of Alemany Boulevard to Trumbull Street.

This project was some 110,000 cubic yards deficient in embankment material. The bulk of the borrow was imported from the Civic Center Plaza, where a large excavation was being made for Brooks Hall and the parking garage, both underground.

One unusual construction feature on this job was the installation of 10 precast and prestressed girders over the James Lick Freeway in six hours. Traffic was detoured off the freeway from midnight to 6 a.m., while two 35-ton truck cranes were used to set the girders in place. During this job the existing Alemany structure was braced with timber bents under the operating area of each crane.

Under a cooperative agreement, the City and County of San Francisco contributed $1,585,000 for construction, right-of-way acquisition, and utility relocation for its share of all work done on this unit south of Silver Avenue. A portion of these funds was spent for the relocation and enlarge-



An aerial view of the Route 82/101 interchange which has been in service since June of 1960. East of James Lick Freeway is the recently completed extension of Route 82 which will some day connect with the Route 480 Freeway in the vicinity of the Bay Bridge.

ment of a 5-foot, 9-inch diameter sewer 500 feet long near Phelps Street and Bayshore Boulevard.

This unit opened to traffic on June 20, 1960. Resident engineers were Loren L. Krueger and G. M. Low for the Bridge Department and H. A. Hart representing the district.

Route 82/101 Interchange to Milton Street

Three months later, in September 1960, contractor Charles L. Harney, Inc. began work on the adjoining section of Route 82, a $4,273,000 project to build 1.1 miles of freeway between the Route 82/101 Interchange and Milton Street, one block west of the Mission Street Viaduct.

Structures included two bridges to carry Alemany Boulevard traffic over the freeway near Gaven and Congden Streets, overcrossing at Mission Street and Justin Drive, the St. Mary's and Gladstone Drive Pedestrian Overcrossings, and 10 concrete retaining walls built to heights of up to 36 feet to reduce right of way requirements.

When the city widened the old Mission Street Viaduct in 1951, an arch section was built over the Alemany Boulevard trafficway. To preserve the architectural integrity of this structure, it was decided to match the arch with the new Mission Street Overcrossing. The Bridge Department designed the structure as a box girder with a parabolic arch over the Route 82 freeway. The area between the freeway and Alemany Boulevard was walled in.

A combination sanitary and storm sewer was enlarged and relocated outside the freeway right of way under a cooperative agreement with the City and County of San Francisco, which contributed $200,900 for the construction of a double 6- by 10-foot reinforced concrete box culvert for 2,000 feet along relocated Alemany Boulevard, crossing the freeway at Trumbull Street.

Since there was a deficiency of 80,000 cubic yards of embankment material, borrow sites were specified on state-owned property within the right of way for the next construction unit of Route 82. This requirement enabled the contractor to obtain necessary embankment material for the project under construction while removing material which would otherwise have become surplus with the next unit. The slopes and grading planes specified for the borrow site were at or above the desired grade.

The eastbound lanes were built first and construction of the westbound lanes was not started until after eastbound traffic had been routed onto the new freeway lanes. The contractor elected to use the steel sideform method of placing Portland cement concrete pavement instead of the slip form method. This job was finished on October 13, 1963. Resident engineer was [illegible] Hart and the Bridge Department was represented by David Hopkins and George Low.

Mission to Ocean

A little more than a year after the above job began, the same contractor, Charles L. Harney, Inc., started work on the next unit of the Route 82 freeway, a $6,089,000 project to build 1.3 miles of freeway, 13 structures, 9 retaining walls, and a sewer protective slab between Mission Street and 0.4 mile north of Ocean Avenue. This project is the key job of the four described in this article, both from the standpoint of the number and type of structures and from the fact that the facilities of the San Francisco Bay Area Rapid Transit District will enter the freeway right-of-way within the project limits.

Representatives of the Division of Highways, the City and County of San Francisco, and the transit district have been working in close cooperation for some six months planning the proposed transit facilities. The transit rail lines as planned will be either on or parallel to the "Southern" Freeway right-of-way all the way from the Baden Street Undercrossing to the San Francisco-San Mateo County line in the vicinity of the Knowles Avenue Transit Station site.

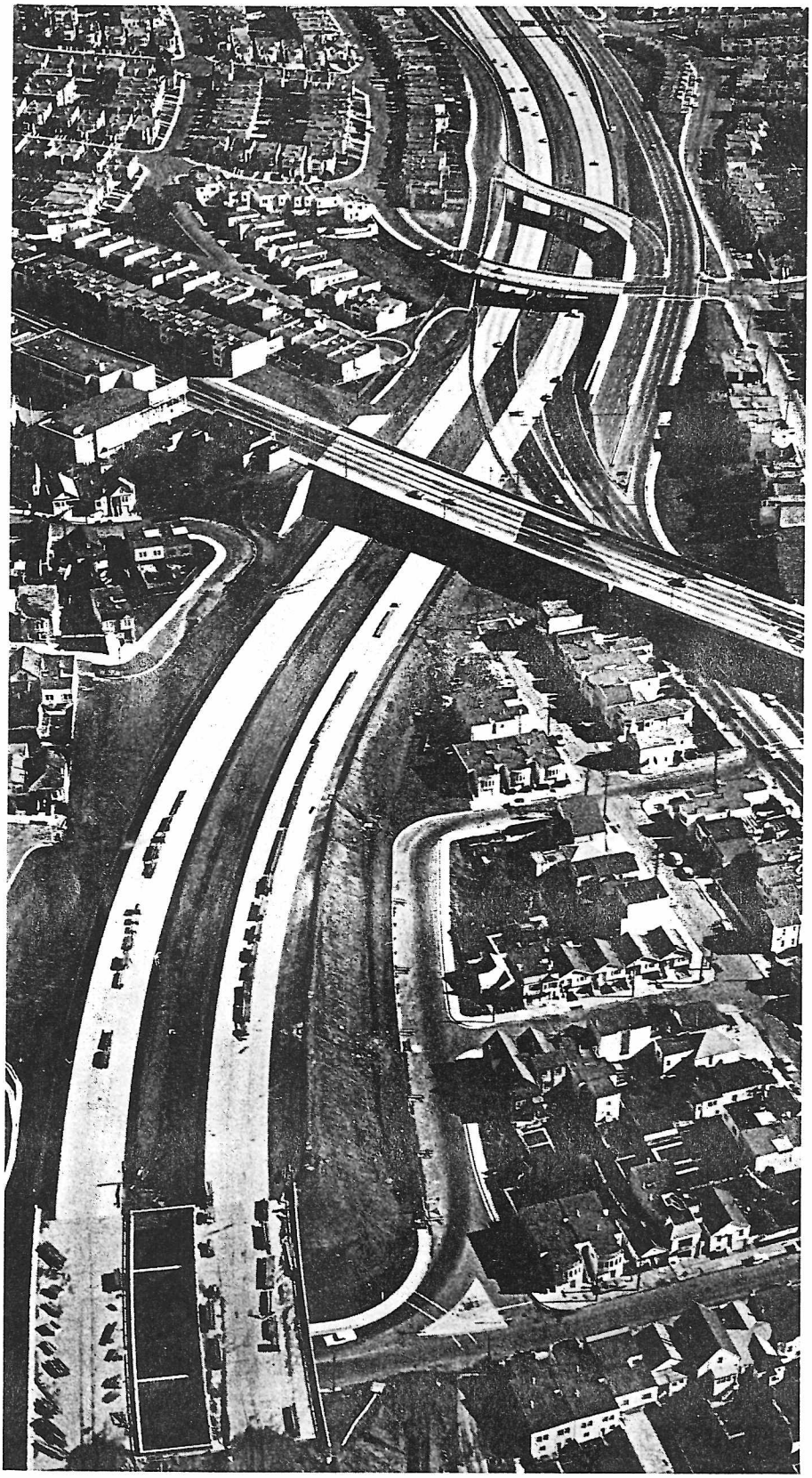
This cooperation was maintained by regular biweekly meetings among representatives of the three organizations and constant interchange of working drawings between the transit authority and highway engineers to coordinate design. Since work on the freeway started on December 13, 1961, and it was not until November 1962 that the electorate authorized the creation of the transit district, freeway construction had been under way for more than two years before design work even started on the transit facilities. However, it is the goal of the combined operation that by the time this article is published, the alignment of transit facilities along the Route 82 freeway will be firm enough to allow the transit engineers to proceed with final design.

Balboa Park

This section of the freeway runs through Balboa Park and across the southeasterly corner of the City College of San Francisco. When it is completed, it will siphon through traffic away from the highly congested city streets of neighborhood shopping districts along Mission Street.

Negotiations with the City and County of San Francisco over pur-

This view shows the Ocean Avenue overcrossing in the foreground with traffic routed around construction. In order can be seen the Geneva Avenue overcrossing and the San Jose Avenue detour.



This view looking east shows the detouring of traffic from the completed portion of the freeway east of the reconstructed Mission Street viaduct to existing Alemany Boulevard. In the background are the ramps and overcrossings provided for traffic on relocated Alemany Boulevard.

chase of rights-of-way in this area were lengthy and involved. But on June 26, 1963, the State of California agreed to pay $807,000 for the land and improvements on approximately eight acres of property in Balboa Park and on the campus of the City College of San Francisco.

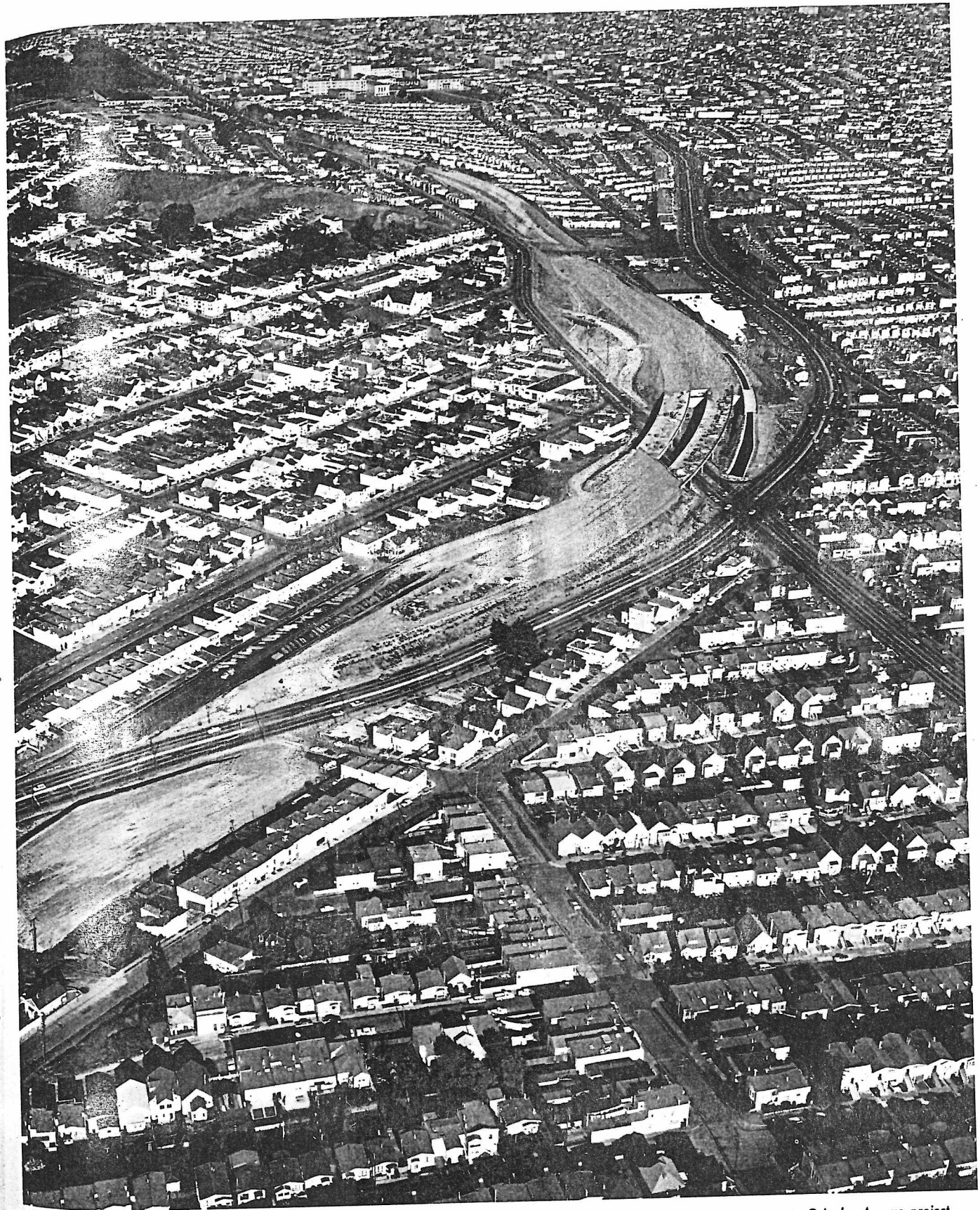
Structures included overcrossings at Paulding Street, Baden Street, Monterey Boulevard On-ramp, Monterey Boulevard Eastbound, and Monterey Boulevard Westbound. Undercrossings were provided at San Jose Avenue (Route 82), San Jose Avenue (outer right), San Jose Avenue (outer left), Branch East, Lyell Street, and Bosworth Street. Other construction included pedestrian overcrossings at Theresa and Lamartine Streets, nine retaining walls for a total length of 7,850 feet, and a 20- by 80-foot protective slab over the reinforced concrete pipe sewer crossing the freeway at Santa Rosa Avenue.

There was an excess of excavation material on this job amounting to more than 400,000 cubic yards, which the contractor disposed of by filling in the Bay tidelands owned by himself. He also used this site for the disposal of 5,000 cubic yards of reinforced concrete rubble resulting from the demolition of the existing Bosworth Street Undercrossing.

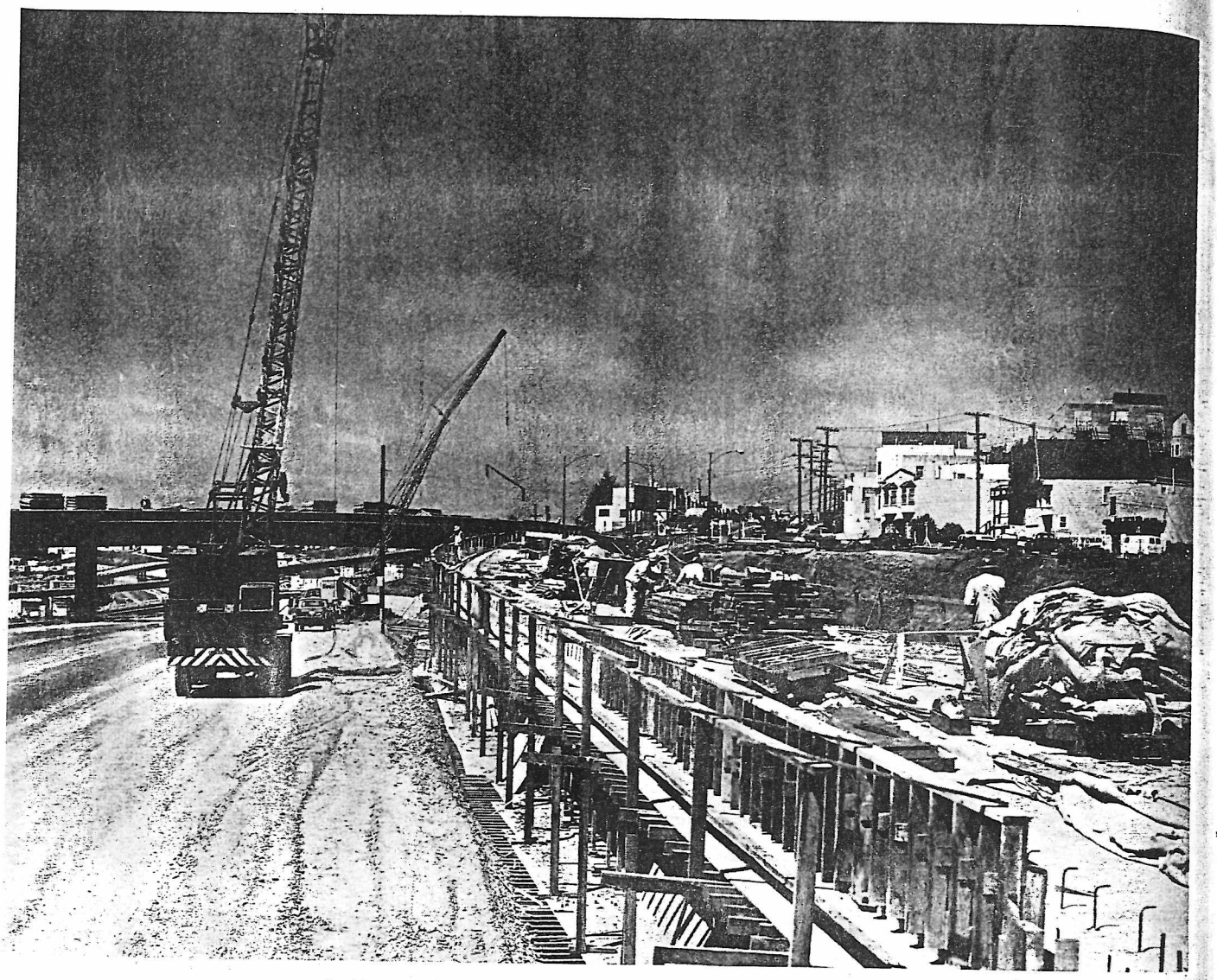
Structure Construction

An engineering and construction problem of no mean proportions was encountered on this unit because of the placing of 11 out of the 13 bridges and 7 out of the 9 retaining walls in the space of less than a third of a mile between Theresa Street on the west and Lyell Street on the east. It was extremely difficult to preserve construction survey reference points in the working area because bridge construction and roadwork operations were often performed simultaneously in this limited area.

Two of the bridge structures, the San Jose Avenue Undercrossing (Route 82) and the Branch East Undercrossing, were built as box girder, single-span, rigid frame, cut-and-cover tunnels under re-routed San Jose Avenue and the freeway. Because most of the bridge construction was performed simultaneously with the road-



Looking northeast from the vicinity of the San Jose Avenue-Sickles Avenue undercrossing along the alignment of the Ocean to Orizaba Avenue project.



Looking westerly toward Monterey Boulevard and access ramp construction.

work, the contractor was required to leave openings in the bridge falsework to permit his heavy equipment and materials to pass through to other sections of the job.

The Branch East Undercrossing, which is 450 feet long, is built on a skew of 60 degrees and the Monterey Boulevard On-Ramp Overcrossing, which, at 710 feet, is the longest structure on this unit, is built on a 40-degree skew to provide for the required minimum radius of curvature, together with span lengths and accelleration lane requirements. To keep right-of-way requirements to a minimum, the median on the portion of this section of Route 82 was designed on a split level from Havelock to Lyell Street.

The demolition and reconstruction of the Bosworth Street Undercrossing was accomplished in two stages, half of the street being open at a time to provide traffic service to both Bosworth Street and San Jose Avenue. Protective sheds were placed over Bosworth Street during demolition work to protect passing traffic.

Because of the clearance requirements of four levels of traveled way, the abutment walls of the San Jose Avenue Undercrossing near Monterey Boulevard are 35 feet high. Another difficult stage of construction in the same vicinity was excavating for retaining walls up to four stories high adjacent to existing streets while permitting traffic to pass through.

On roadway construction, two 12-foot subgrade machines were tied together to permit trimming of the cement-treated base on a 24-foot width.

This section of the Route 82 freeway will not be usable until completion of the fourth unit, described below. The Resident Engineer is E. L. Raymond, while K. L. Baumeister represents the Bridge Department.

Ocean to Orizaba

The same contractor started work October 22, 1962, on the fourth unit, a 1.8-mile section from Havelock

Street, 0.4 mile north of Ocean Avenue, to Orizaba Avenue. Actually, Route 82 leaves the freeway alignment at San Jose Avenue on this project and follows San Jose Avenue in a southwesterly direction to the San Francisco-San Mateo County line. The remainder of this job, from San Jose to Orizaba Avenue, is on State Highway Route 1.

Since this and the preceding unit were both being built by the same contractor and were both scheduled to be finished at approximately the same time, pouring of the portland cement concrete pavement was done in one continuous operation. Subcontractor Gordon H. Ball used a modified slipform paving machine 36 feet wide to pave three 12-foot lanes on both jobs in a single pass, then the machine was turned around and the opposite lanes were paved in another pass. This technique had never before been used in this district for a 36-foot width.

Structures on the fourth unit included overcrossings at San Jose, Geneva and Ocean Avenues, and the San Jose Avenue Offramp at Sickles Avenue. Undercrossings were provided at the Sickles Avenue Onramp and the San Jose-Sickles Separation, and pedestrian undercrossings were installed at Havelock Street and Whipple Avenue.

In addition, a temporary onramp connection to the freeway was provided from Alemany Boulevard at Orizaba Avenue to allow full use of the freeway from Orizaba Avenue to the Route 82/101 Interchange and divert such traffic from city streets. One unusual feature was the provision of pedestrian access ramps to the freeway from the Ocean Avenue Overcrossing to permit passengers from express buses on the freeway to transfer to locals on Ocean and Geneva Avenue.

Other structures included nine reinforced concrete cantilever retaining walls on spread footings totalling 5,410 feet in length, two concrete crib retaining walls, and two gravity type retaining walls. One crib wall, which is 35 feet high and 450 feet long, was placed to protect the Cayuga Playground area from erosion. The abutment wing wall at the San Jose Avenue Overcrossing and the pedestrian access ramps at the Ocean Avenue Overcrossing were built in two stages to provide continuous traffic service.

Resident Engineer on this job was K. G. Nakagawa and L. S. Miyashiro represents the Bridge Department.

Freeway Extensions

The westerly extension of this freeway is now under construction as part of a major contract for construction on Interstate Route 280 in San Mateo County. When the work is completed, toward the end of 1966, this 0.4-mile section of Route 1 will carry "Southern" Freeway traffic from Orizaba Avenue to the county line in the vicinity of St. Charles Avenue and join to Interstate Route 280 in San Mateo County.

East of the James Lick Freeway (Route 101), work was completed February 10, 1964, by Peter Kiewit Sons' Company on a $4,100,000 project to build a two-level viaduct from the Route 82/101 Interchange to Newcomb Street on Route 82. This unit will not be usable until completion of the next unit, for which bids were opened on May 20, 1964. The contract has been awarded to the Guy F. Atkinson Company to build the easterly extension of Route 82 from Newcomb to Army Street, including ramp connections to Army Street and Pennsylvania Street. These ramps will be an integral part of the future Islais Creek Interchange. This Interchange will be built when future Route 87, often referred to locally as the "Hunters Point Freeway," is constructed in this area.

Completion of this $6,100,000 project, expected early in 1966, will provide an alternate route paralleling U.S. 101 from the Route 82/101 Interchange through an industrial area of San Francisco to the general vicinity of Army Street above Third Street.

Landscaping

It was planned to landscape each section of Route 82 after construction was completed. Landscaping of the Interchange was completed on March 15, 1962, at a cost of $46,000. The sum of $110,000 has been budgeted and bids were opened on June 3, 1964, to landscape the section between Route 101 and 0.1 mile east of Milton Street. The 1964-65 Construction Program contains $75,000 for landscaping the one-mile section between Havelock and Mission Streets; another $75,000 will be required to landscape the section of Route 82 freeway from east of Orizaba Avenue to 0.4 mile north of Ocean Avenue and $35,000 to landscape the easterly extension from Route 101 to Revere Avenue.

With the completion of the construction work described above, Route 82, the "Southern" Freeway, will provide six lanes of full freeway across some six miles of the southern part of San Francisco from the southwesterly area to the industrial areas east of US 101. Later, when traffic conditions warrant, another lane will be constructed for each direction of freeway traffic within the existing right-of-way to provide the ultimate eight-lane width planned.

Bids Called on Two Big Interstate Jobs

The State Division of Highways has called for bids on construction of two major sections of Interstate 5 in *San Diego* and *Glenn* Counties.

The $6,612,000 *San Diego County* project calls for grading and paving to construct 3.4 miles of eight-lane Interstate 5 freeway on new alignment between Miramar Road and one-half mile south of Carmel Valley road near the north city limits of San Diego. The project includes construction of an interchange structure linking Interstate 5 with the future Interstate 805.

The $6,600,000 *Glenn County* project calls for grading and paving to construct an initial four lanes of an ultimate six-lane Interstate 5 freeway on new alignment between one mile north of Artois and the Tehama county line, a distance of 11 miles. The project calls for an extension of State Sign Route 32 from Sixth Street in Orland to connect to the new Interstate 5 route west of Orland, including an interchange between the two routes at the latter point.

Interstate 280

Design of New Freeway Stresses Aesthetics

By R. A. HAYLER, Deputy District Engineer

The world's most beautiful freeway!

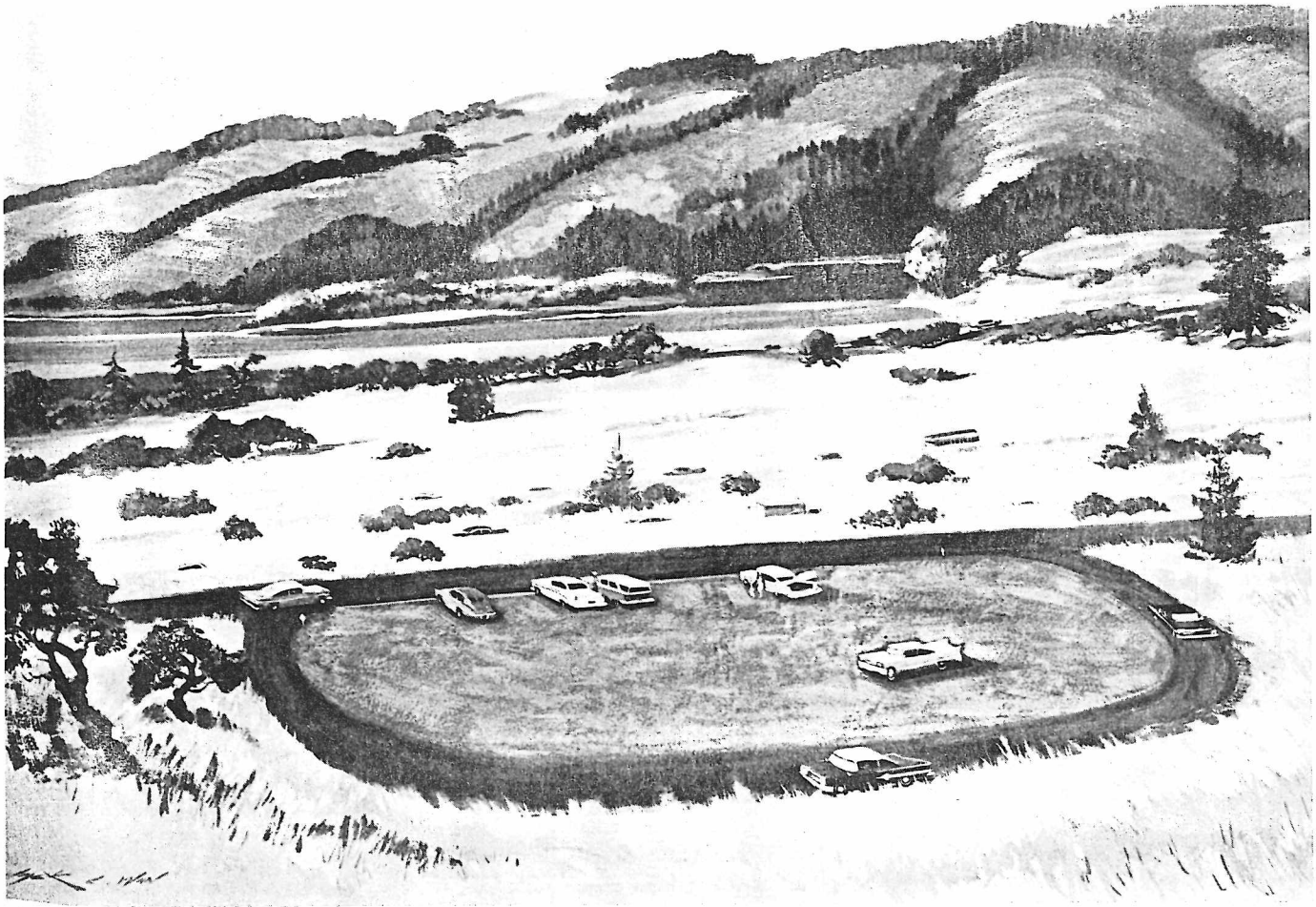
That's the description the residents of the San Francisco Bay area would like to see applied to the new Interstate Route 280, known locally as the "Junípero Serra" Freeway. And the design engineers of the California Division of Highways are making every effort to oblige them—always keeping in mind the two key words: aesthetics and cooperation. This freeway traverses the foothills of the Peninsula between San Jose and San Francisco.

The conception and design of this freeway has truly been a cooperative effort on the part of all concerned. The bridge and highway design engineers of the Californa Division of Highways have had the problem of designing aesthetics into the route and still meeting the requirements of geometric and structural standards, reasonable cost, and approval of the local citizens.

The U.S. Bureau of Public Roads, which will administer the expenditure of some 92 percent of the $157,500,000 total cost of this new interstate freeway, has agreed that reasonable additional costs over those normally allowed may be incurred to provide split-level design, independent roadways, and other techniques of aesthetic treatment. Construction costs on this 50 miles of 6-, 8-, and 10-lane freeway will amount to $100,000,000, with the balance going to right-of-way acquisition.

Emphasis on Aesthetics

The increasing emphasis which the Bureau of Public Roads is placing on aesthetics in highway location and design is revealed in a circular memorandum from Federal Highway Adminis-



View looking southwest from Vista Point shows the sparkling waters of Crystal Springs Reservoir and the forested slopes of Cahill Ridge beyond in this artist's rendition.

trator Rex M. Whitton to engineers of the bureau dated March 1, 1963.

He urged them to "give conscious thought to insuring more than ever the pleasing appearance of our highways. . . . Fit the highway to the landscape—take advantage of the topography, wherever economically feasible, to have separate alignments and profiles for each one-way roadway—streamline the cross sections—use judicious planting for the prevention of soil erosion, the joining of the slopes with roadside native growth, and to possibly act as a buffer for noise and sight control—and design structures, small and large, so that they have architectural excellence." Such miscellaneous structures as walls, fencing, guardrails, and signs should also receive that extra touch of consideration which will add to the appearance of the highway, he said.

"I am sure that with proper attention to all of the other steps in the development of highways that this extra effort in insuring pleasing appearance will add greatly to a highway system of which we can all be proud," concluded Mr. Whitton.

The *Planning Manual* of the California Division of Highways urges the consideration of aesthetic factors in the planning and design process in this manner. "Scenic values must be considered along with safety, utility, economy, and all the other factors considered in planning and design. This is particularly true of the many portions of the state highway system situated in areas of natural beauty. . . . Economy consistent with traffic needs will always be of paramount importance, although a reasonable additional expenditure can be justified to enhance the beauty of the highway itself."

It goes on to mention such aesthetic factors as:

1. Location to preserve the natural environment and lead to and unfold scenic positions.
2. Fitting the general alignment and profile of the highway to the area traversed.
3. Curvilinear alignment.
4. Gently rolling profile.
5. Timber screens.
6. Selective clearing to open up scenic vistas.
7. Wide medians.
8. Independent roadways.
9. Flattened slopes.

"Structures should be located and designed to give the most pleasing appearance, planting should be in harmony with the surroundings, and interchange areas should be graded to provide an expanse of naturalistic easy flowing contours, enhanced by planting cover appropriate to the locality."

Intense Public Interest

The intense interest of the residents of the area in the location of Route 280 has been well demonstrated by the amply attended map displays and public hearings when the route adoption was being considered; many meetings between officials of San Francisco, San Mateo, Santa Clara Counties, the many cities affected and the Division of Highways; correspondence and discussions with such organizations as the California Roadside Council, the California Cycling Association, the Committee for Green Hills, local property owner organizations, and others.

The State Division of Beaches and Parks, the San Mateo County Park and Recreation Commission, the San Mateo County Horsemen's Association, and the Tri-County (San Francisco, San Mateo and Santa Clara) Committee for Freeway Beautification have presented ideas and information concerning their own particular interests in the area.

One group, formed in 1959 specifically to safeguard the preservation of the natural beauty of the area through which the freeway will pass, and to insure appropriate design standards for the Interstate Route 280 (Junípero Serra) Freeway, is named the Peninsula Highway Policy Committee. Composed of representatives of San Mateo, San Francisco and Santa Clara Counties and particularly planning staffs of the counties and the many cities situated in the three counties and also including a representative of Stanford University, it has held many meetings with officials of the Division of Highways in which plans, photographs and models were exhibited and suggestions relating to highway aesthetics were offered.

Varied Terrain

This freeway route, much of which will be built on new alignment along the 50 miles from San Francisco to San Jose, will consist initially of 10-, 8-, and 6-lane sections. It will be built as a 10-lane freeway between the Route 1 and Route 82 freeways in Daly City. Interstate Route 280 will be a full eight-lane freeway from that point southerly to Magdalena Avenue in the vicinity of Los Altos. From there it will be built as a six- (ultimate eight-) lane freeway for the remainder of the route into San Jose.

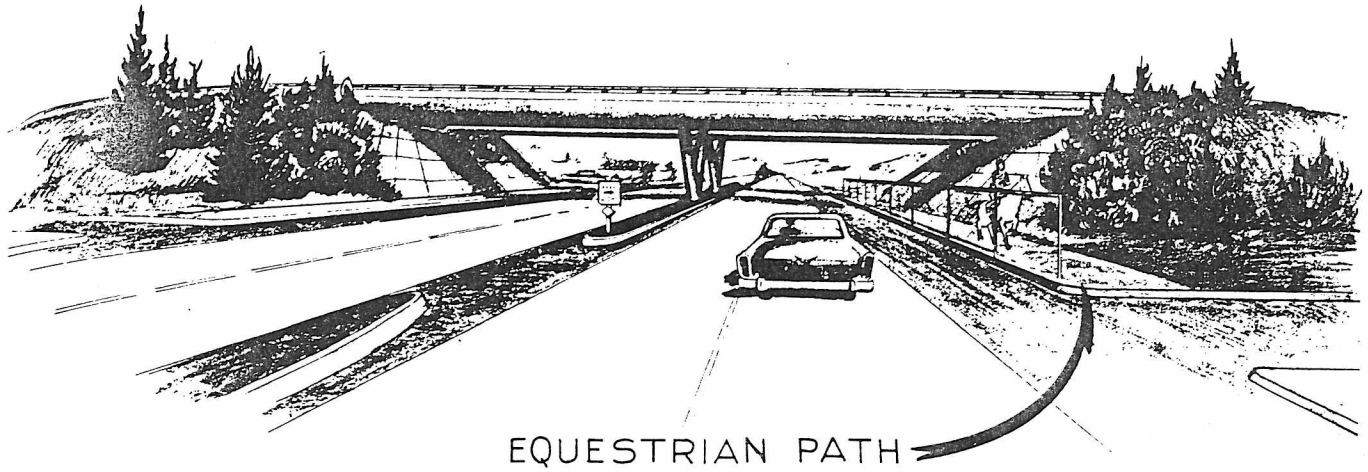
The varied terrain of this new freeway lends itself nicely to aesthetic treatment. Its topography ranges from the rugged ridges and forest-covered slopes of the 14 miles of watershed lands owned by the San Francisco Water Department, along the lovely chain of lakes which make up the Crystal Springs Reservoir, past the gracious estates of Woodside, across 4 miles of gently rolling lands of Stanford University, through beautiful Los Altos Hills, and into the flatter country approaching San Jose.

Construction of this route has already begun. In fact, the first completed portion in San Jose was opened to traffic on March 16, 1964. Other contracts are underway with more coming soon—so soon that the entire 50 miles of freeway are scheduled to be either in operation or under construction in the next five years.

Projected traffic figures for 1975 show that from 50,000 to 150,000 cars each day will be using the new route, with the low figure estimated for the less congested areas away from the metropolitan centers of population and industry. This will offer much needed relief to the Bayshore Freeway, El Camino Real and local roads along the way.

History

Planning for this route started in 1928 when the Counties of San Francisco and San Mateo formed Joint Highway District 10 to develop a four-lane extension of Junípero Serra Boulevard to the south. On July 5, 1956, the Legislature adopted the



A drawing of one of the equestrian paths being provided for horseback riders to cross under the freeway at Robleda Road, Elena Avenue, Magdalena Avenue and Canada Road in Santa Clara County. The paths consist of graded earth to provide better footing for the horses and to preserve the rustic character of the neighborhood.

seven-mile constructed portion of this route as State Highway 237 (now Route 117) and also dissolved Joint Highway District 10.

Meanwhile the Division of Highways, in cooperation with the U.S. Bureau of Public Roads, studied possible routes for inclusion in the National System of Interstate and Defense Highways, which had been authorized by Congress in 1944. The U.S. Commissioner of Public Roads approved the inclusion of a route following the Junípero Serra Boulevard extension in the interstate system on September 15, 1955. The 1957 Legislature added Route 239 (now Interstate Route 280) to the state highway system "from Route 56 (Route 1) near Daly City to Route 2 (Route 82) near San Jose on a route to be selected by the Califorina Highway Commission." The present route was adopted on November 27, 1957, July 23, 1958, and July 20, 1960, after the public hearings and map displays mentioned above.

Cooperation

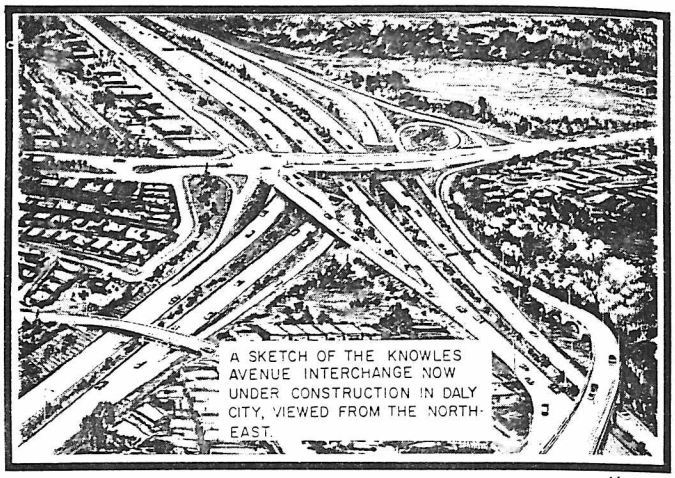
The theme of cooperation runs like a bar of reinforcing steel through the story of the design of Interstate Route 280, tying together the considerations of design standards and reasonable cost requirements on the one side and the aesthetic values and desires of all concerned on the other into a unified whole that will combine beauty and utility into the world's finest freeway. This cooperation includes the agreements arrived at in right-of-way purchase and utility relocations as well as the more formal cooperative and freeway agreements.

One example of how seemingly opposite requirements of two agencies was resolved concerns the new Foothill Junior College location. Soon after route adoption it was discovered that the Foothill Junior College District had chosen the junction of the new freeway and El Monte Avenue for the site of its new two-year college. The freeway neatly bisected the proposed 90-acre site. By minor adjustment in freeway location and college site, a compatible plan was developed and what could have been a major battle was resolved through the splendid cooperation of Dr. Calvin Flint, president of the college, and his efficient staff. As Dr. Flint pointed out, the college required the excellent transportation facilities of the freeway and any minor adjustments in college plan were well justified.

The contributions of various local agencies to the construction of Interstate Route 280 on the sections which have been completed or are currently under construction add up to approximately $1,000,000 to date. The balance of the agreements yet to be negotiated primarily concern the relocation and betterment of storm drains, sanitary sewers, or water facilities. Although utility relocations are normally covered by utility agreements, those areas in which new facilities or betterments to existing facilities are requested become subject to cooperative agreements. By this effort an overall improvement benefiting both local and state agencies is the result.

Design Techniques

The current design of Interstate Route 280 resulted from a complex study of which techniques would best fit the roadway to the contour of the land. Such practices include slope rounding, contour grading, split-level design with the independent roadways varying as much as 70 feet in elevation (in the vicinity of existing Ralston Avenue), variable width median ranging from 22 feet at the San Bruno Avenue grade separation to a maximum of 200 feet at a number of locations along the route, broad sweeping horizontal curves with a minimum radius of 2,000 feet to allow the motorist to enjoy the panoramic views in greater safety, maximum grade of 4 percent throughout the length of the route, and unusual architectural treatment of the more than 70 structures on this freeway to enhance their aesthetic appearance and cause them to blend with the natural beauty of the area which the route traverses.



A SKETCH OF THE KNOWLES AVENUE INTERCHANGE NOW UNDER CONSTRUCTION IN DALY CITY, VIEWED FROM THE NORTH-EAST.

SAN FRANCISCO

FRANCISCO CO.
MATEO CO.

101

DALY CITY

SAN
SAN

SAN BRUNO

SAN MATEO

EL CAM

82

92

280

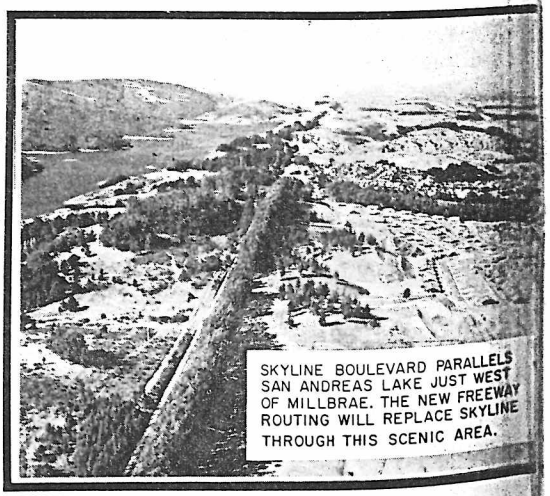
SAN ANDREAS LAKE

CRYSTAL SPRINGS RESERVOIR

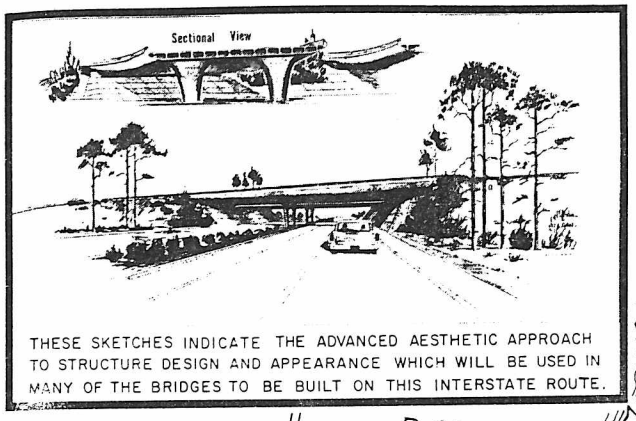
1

PACIFIC OCEAN

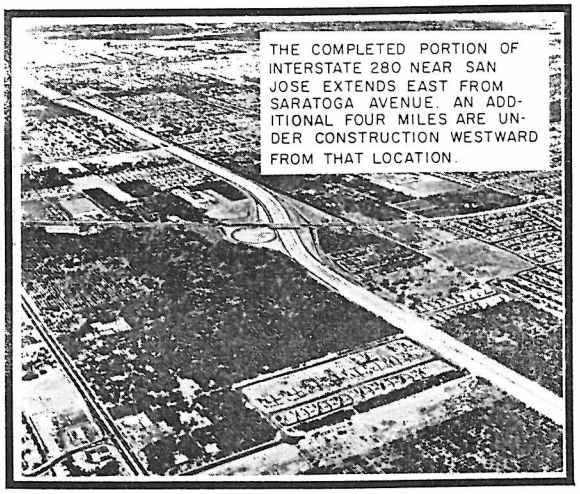
N



SKYLINE BOULEVARD PARALLELS SAN ANDREAS LAKE JUST WEST OF MILLBRAE. THE NEW FREEWAY ROUTING WILL REPLACE SKYLINE THROUGH THIS SCENIC AREA.



THESE SKETCHES INDICATE THE ADVANCED AESTHETIC APPROACH TO STRUCTURE DESIGN AND APPEARANCE WHICH WILL BE USED IN MANY OF THE BRIDGES TO BE BUILT ON THIS INTERSTATE ROUTE.



THE COMPLETED PORTION OF INTERSTATE 280 NEAR SAN JOSE EXTENDS EAST FROM SARATOGA AVENUE. AN ADDITIONAL FOUR MILES ARE UNDER CONSTRUCTION WESTWARD FROM THAT LOCATION.

INTERSTATE 280 STATUS

LEGEND

COMPLETED

UNDER CONSTRUCTION

BUDGETED

DESIGN

Structures

After spending considerable time with the noted San Francisco architect Mario J. Ciampi, the Bridge Department designers came up with a new look for the structures on this freeway. Some aspects of his proposed treatment are combined with economic structural requirements to produce such new and pleasing features as curved edges on the bridge and superstructure to create the illusion of thinness, variety in form and appearance of the supporting piers, extension of the bridge railing to eliminate the need for metal guard railing at the bridge ends, and liberal use of curved and oblique surfaces to soften the lines, reducing the visual impact of the concrete structures and thus blending into the surrounding area. Those structures which cross over the freeway will be prestressed to reduce the thickness of the overhead structure and provide a thinner, more pleasing profile.

San Mateo Creek Bridge

The most impressive structure on the entire length of Interstate Route 280 will be the bridge over San Mateo Creek in Hillsborough. More than 1,600 feet long and soaring 270 feet above the creekbed below, the bridge will have a five-span welded steel girder superstructure resting on four concrete piers consisting of bents with tapered legs meeting at the top in a graceful arch. The twin roadways will be connected by a solid slab in the middle with a 22-foot division area, concrete barrier rails at the outer edges, and a concrete barrier in the division area with expanded aluminum glare shield.

There has been a conscious design of shadow lines in the entire structure by Bridge Department designers, who realized that the adjacent area is one of the more attractive parts of the Peninsula and devoted a great deal of study to it. This structure will complement its surroundings, be a credit to the adjacent community, and a source of pride to its builders. It will be visible from many angles because of its closeness to the parking area at Crystal Springs Dam and its location above the winding Crystal Springs Road.

Scenic Highway

The beauty of the area in which the San Mateo Creek Bridge will be located has been recognized by the State Legislature. It has included that section of Interstate Route 280 overlooking the chain of lakes in the San Francisco Water Department watershed lands area as part of the California scenic highway system.

The concept of a scenic highway system in California has been under consideration since 1960, when the Legislature asked the Departments of Public Works, Water Resources, and Natural Resources, and the State Office of Planning to collaborate on an investigation and prepare a report and recommendations for a statewide system of scenic highways. The 1961 session authorized appointment of a seven-member committee to consist of officials of counties and cities, of persons having special competence in the fields of landscape architecture as it relates to scenic conservation, and others interested in highway, land planning, and park problems to act in an advisory capacity to this investigation.

This report was considered at the 1963 session of the Legislature, which adopted a system including some 4,900 miles of state highway routes as state scenic highways. The writers of the report defined a scenic highway as having the following attributes:

> It is a portion of the state highway system, it traverses areas of outstanding scenic beauty, and its location, design, and construction receive special attention in terms of impact on the landscape and in terms of visual appearance.
>
> It is the intent of the Legislature in designating certain portions of the state highway system as state scenic highways to establish the State's responsibility for the protection and enhancement of California's natural scenic beauty by identifying those portions of the state highway system which, together with the adjacent scenic corridors, require special scenic conservation treatment.

Vista Point

In order to give motorists a chance to stop and enjoy this spectacular view at their leisure, a vista point will be built a half-mile north of Crystal Springs Road in San Mateo westerly of the Hillsborough town limits. Northbound travelers will be able to get a bird's eye view of the Crystal Springs lakes, the tree-covered slopes of Cahill Ridge to the west, the impressive San Mateo Creek Bridge to the south, and the eight lanes of the "Junípero Serra" Freeway, divided by a 200-foot-wide median in this area, some 60 feet below this vantage point.

Just above the adjacent freeway, an oasis for weary travelers will provide fresh water, picnic tables, and sanitary facilities in a full-fledged rest stop, which will be contour graded to blend into the background and planted with trees to provide shade and enhance the area. A pedestrian ramp with decorative handrail will lead up from the rest stop to the vista point.

Hiking, Horseback Riding

Residents of both San Mateo and Santa Clara Counties expressed concern about the availability of access to foothill areas, after the freeway is built, for such recreational activities as hiking and horseback riding.

In San Mateo County, assurance has been given to the county park and recreation department, the county hiking and trails committee and other organizations that 13 of the vehicular over- and undercrossings between Crestmoor Drive in San Bruno and the Santa Clara county line will include from 7 to 10 feet of additional space for the use of nonvehicular traffic.

Ten of the separation structures in Santa Clara County will also include space for nonvehicular traffic. At three of these crossings, plus one near Woodside in San Mateo County, for the benefit and safety of both the motorist and the horseback rider, there will be separate graded earth paths provided for equestrian use. These crossings will preserve existing bridle path routes which are extensively used.

Overall Design

Because of the size of the job, the design has been divided among Assistant District Engineers M. E. Hardin, J. C. Black, and W. P. Smith, with Design Engineers Barney Camp-

bell, Bart Berger, Drury Elder, E. J. Stewart, and E. A. Jones supervising the project engineers of the individual units.

The design of all bridge structures on the route was supervised by A. L. Elliott, Bridge Engineer—Planning, of Headquarters Bridge Department. Senior Bridge Engineer Bob Cassano was in charge of the structure design, and Bridge Architectural Senior Warren S. Ludlow of the Bridge Department's Architectural Section was instrumental in the finalization of the aesthetic design which will be used.

The Division of Highways makes every effort to provide a balance of earthwork while seeking to avoid long hauls. By hauling excavation from one spot to a fill on the same or an adjacent project the earthwork is in balance and an economical job results. That is essentially the situation on the entire length of the "Junípero Serra" Freeway project.

The 50-mile length of Interstate Route 280 has been separated into 15 units for project purposes. This article will discuss specific features in order from north (San Francisco) to south (San Jose). Since project limits are described by readily identifiable street names or landmarks for the benefit of the general reader, there is considerable overlapping of the areas discussed and more than one project is discussed at a time.

Daly City to County Line

This entire job now under construction is essentially a mile-long 6,000-foot) interchange of 10- (ultimately 12-) lanes running southerly from the three-level Knowles Avenue Interchange, where Route 1 will lead traffic from the southwesterly part of San Francisco into the Junípero Serra Freeway, to 1,500 feet south of Eastmoor Avenue, where Route 1 will leave Route 280 in a westerly direction. The bottom level of the Knowles Avenue Interchange is a 700-foot-long cut and cover tunnel with box girder construction on the top slab. It will funnel southbound traffic from Route 1 into Interstate Route 280.

Right-of-way acquisition in this area included some 11 acres formely a part of the Lake Merced Golf and Country Club. Extensive negotiations took place before a settlement was reached. Work is now in progress to reestablish the course to the same standards and length it formerly possessed, including rearrangement of the entire course, filling of a deep gulch at the northerly end of the property, and construction of new club and caddy houses. Play will be restricted to nine holes during the construction period.

South San Francisco to Daly City

Design on this unit was delayed for some time while studies were made of alternate interchange plans affecting adjoining subdivisions. Although big cuts (200 feet maximum) and fills (120 feet maximum) will be made during the freeway construction, the owners will cooperate in grading their lands to match the freeway construction, thus conserving property and providing more economical use for both subdivision and freeway. Regional shopping centers are envisioned by the subdividers at Westborough Boulevard and Serramonte in Daly City.

Although none of the cemeteries in Colma or Daly City will be affected by the new Interstate Route 280 freeway, work is now in progress on the relocation of the Chinese Cemetery Road to a bench on the Route 1 freeway right-of-way in order to continue cemetery access after freeway completion. Before the relocation work could begin, however, a problem had to be solved. The Chinese believe it improper to carry the remains of their deceased through the back gate of a cemetery. Grading operations for the Serramonte subdivision had cut off the cemetery's front gate access road to the west and the Route 1 construction threatened the access road to the east. The only solution was for the subdivider to construct a temporary access road to the main gate from Skyline Boulevard at no charge to the cemetery association, to serve the cemetery until relocation of the regular road is finished.

Drawing of a section of Interstate 280 (looking north) showing the split-level independent roadways for each direction of travel passing through scenic vistas surrounding the Crystal Springs Reservoir. The area shown above is just south of the site of the future San Mateo Creek Bridge.

The Route 280 freeway will cut through the southwesterly tip of the Serra Vista School property in South San Francisco. However, since the freeway will be depressed in this area, it will not be readily visible nor audible from the school buildings.

San Bruno to South San Francisco

The outstanding feature of this section will be the four-level interchange located between San Bruno Avenue and Sneath Lane where the future Route 186 will provide a cross-county, east-west lateral traffic artery. The lowest level, the branch connection that will carry northbound traffic on Route 280 easterly to Route 186, will be 30 feet below ground level. This structure, to be of box girder design with rounded ends, will present a pleasing picture.

Although the overall design of Interstate Route 280 will avoid the use of retaining walls as much as possible, consideration is being given to their aesthetic apperance where they are used. Studies are being made of one 1,200-foot section between Sneath Lane and Valleywood Drive where it is proposed to place step retaining walls from 6 to 12 feet apart with planting between. One wall will remain a constant 6 feet in height while the other will vary from 0 to 6 feet.

Hillsborough to San Bruno

The chain of lakes that store the water supply of the City of San Francisco begins near the northerly end of this part of Interstate Route 280. As increasing turbidity of the water and protection of the lakes from pollution has been a matter of concern to the city water department for some time, it has been decided that a new filtration plant will be built at Crystal Springs Road in San Bruno. Grading for the freeway in this area will include preliminary grading for the plant site. An undercrossing will be provided to connect the new plant with the water department work area at Crystal Springs Lake and a continuous service road will be constructed on the westerly side of the new freeway from the vicinity of Larkspur Drive in Millbrae to the Crystal Springs Golf Course. Access to the service road will be provided at all interchanges.

Another design problem is that of control of drainage from the new freeway slopes during and immediately after construction. Several pumping plants will be provided in a dual drainage system on the wesrerly side of the freeway to divert turbid water to the easterly slopes, away from the lakes. Clean water will drain down into the lakes.

The old Junípero Serra Boulevard, which the new freeway follows, ends in this area and the new route swings in a southwesterly direction roughly paralleling Crystal Springs Road in San Bruno to join Skyline Boulevard (Route 35) heading south.

The section of the new Route 280 from Millbrae to Woodside overlooking the watershed is one of rare scenic beauty. Motorists in this vicinity will be able to enjoy panoramic views of the lakes and the forested hills behind them from both of the independent roadways, separated by a median varying in width up to 200 feet. Skyline Boulevard between Trousdale Drive and Millbrae Avenue will be superseded by Route 280 after the new freeway is completed.

Woodside to Hillsborough

The four units included in this section encompass some of the most breathtaking vistas to be seen along the entire "Junípero Serra" Freeway route, which follows a path generally easterly of Skyline Boulevard in this area and will permit motorists to enjoy the pleasing panoramas of the verdant greens of the Crystal Springs Golf Course, the sparkling lakes below, and the deeper green of the mountains in the distance to the west. Northbound travelers may pause at the combination vista point-rest stop, refresh themselves, and enjoy the view at their leisure. The vista point and the San Mateo Creek Bridge have been described earlier in this article.

After long negotiations with the San Francisco Water Department, which owns the property, some 10 acres of the Crystal Springs Golf Course were acquired by our right-of-way agents. While only three holes will be directly affected by the freeway, it will be necessary to revise the entire first nine and reconstruct the 15th green and the 16th tee. Because of the topography of the land and because the slope is from the freeway to the reservoir, the fairways, tees, and greens must be laid out carefully to minimize the possibility of turbid water draining down into the reservoir. The entire irrigation system must also be revised. A golf course architect has been employed to supervise the necessary course revision.

The work, which is now in progress by the City of San Francisco and which will be paid for by the Division of Highways, is scheduled for completion by June 1, 1965. The division will also build an entrance road to the golf course from the new Black Mountain Road Interchange and is working closely with water department officials to avoid disruption of the landscape and minimize the taking of trees.

This section also includes connections to two cross-county state highway laterals—the Route 92/280 Interchange at Ralston Avenue and the Route 114/280 Interchange at Woodside Road.

A private service road for the watershed area will be built from Ralston Avenue south to the city limits of Woodside with access at all interchanges, roughly parallel to the new freeway. Northerly of Ralston, portions of Skyline Boulevard will also provide access to the watershed area.

The future southern site of the College of San Mateo is located easterly of the freeway between the future Farm Hill Boulevard extension and Godetia Drive. The campus of the proposed new Sequoia Union High School District site in Redwood City will be located nearby on the northerly side of the Farm Hill Boulevard extension. The Division of Highways is cooperating with the school authorities by providing proposed freeway grading and alignment plans for use by their architect and engineer. The interchange at Farm Hill Boulevard will serve both college and high school traffic, as well as the anticipated increased population of the area.

Woodside Road to Cupertino

This section of Interstate Route 280 winds through the lands of Stanford University and continues southerly

through the beautiful Los Altos Hills area, presenting more enchanting views to the motorist.

The 272-foot-long bridge that will carry freeway traffic over the linear accelerator is under construction on Stanford University property. Designed to harmonize with the linear accelerator buildings, it will have a steel girder superstructure and circular supporting columns. Due to be completed in March 1965, it is being built ahead of the adjacent freeway sections so that its construction can be coordinated with the construction of the linear accelerator by the Atomic Energy Commission.

The pilot studies for aesthetic design of the freeway bridge structures were conducted on structures proposed in the Los Altos Hills section of the freeway. Models and sketches of bridge structures proposed at Mora Drive, St. Joseph Avenue, El Monte Avenue and Magdalena Avenue were shown to various committees and received widespread publicity in newspapers throughout the San Francisco Bay area. The resulting public acclaim encouraged the adoption of this design for most of the bridge structures on Interstate Route 280.

Cupertino to San Jose

The newly constructed portion of Interstate Route 280 joins State Route 17 in San Jose. Design of the section within the limits set above involved many intricate problems which required long and involved negotiations with the governmental units and groups concerned before they could be solved satisfactorily.

Design for the freeway in the Los Altos-Cupertino area was held up for approximately two years pending a decision on proposed abandonment of a branch line of the Southern Pacific Railroad. Abandonment approval by the Interstate Commerce Commission was recently affirmed, which will allow construction by Santa Clara County of its Foothill Expressway following the former railroad right-of-way. With this decision, and removal of the rails, the State is now completing its freeway plans in the area based on this new set of facts.

The division plans to relocate the Permanente Spur (serving the Kaiser Permanente Cement Plant) to parallel the new freeway. Santa Clara County plans to use the railroad right-of-way easterly of Route 280 for its new Foothill Expressway. By terms of a cooperative agreement with the county, the division will build portions of the Foothill Expressway at the Foothill-Route 280 Interchange.

Another knotty design problem is that of providing access to the facilities of the California Water Service Company, the Maryknoll Seminary, and the property of the Roman Catholic Archbishop of San Francisco since access would have been blocked by the freeway and the SPRR Permanente Spur. It will be solved by construction of a combination public-private road designed to provide access to both existing and relocated water tanks, Maryknoll Seminary, and the Catholic lands, on which development of a golf course and cemetery are planned. The private portion of the service road will extend from the vicinity of Arboretum Road to Maryknoll Road and will serve the Maryknoll Seminary only. The railroad service road crossing will be at separated grades.

Several cooperative agreements were reached in this area. In one, the division bought the right-of-way and agreed to build the Junípero Serra channel from Stelling Road to Calabazas Creek on a 50/50 basis, for which the Santa Clara County Flood Control and Water District will pay an estimated $275,000. Another agreement was reached where Route 280 is located adjacent and approximately parallel to Moorpark Avenue, a two-lane city street. The Division of Highways purchased the right-of-way to widen Moorpark Avenue to a four-lane street from Winchester Road to Saratoga Avenue. The City of San Jose will build the street, which will serve as a frontage road.

The section of Interstate Route 280 between Saratoga Avenue and Stelling Road, now being constructed, is scheduled for completion in March 1965.

The most southerly section of the new freeway, from Forest Avenue in San Jose to Saratoga Avenue, was opened to traffic on March 16, 1964. A major construction feature of the work was the modification of the full cloverleaf interchange on the existing freeway at Stevens Creek Boulevard to accommodate collector roads and direct freeway-to-freeway connections.

Erosion control will be included as part of each construction contract on this entire route. In addition, it is generally proposed in Santa Clara County northerly of Route 237 and in the San Mateo County contracts to include 10-foot iceplant borders on each side of the freeway shoulders, with the remainder of the cut and fill slopes to be planted with inoculated seed of strawberry clover.

Landscaping is planned to begin during the next planting season after each construction contract is completed. Plans for landscaping the first completed portion of the route, from Forest Avenue to Saratoga Avenue, have been prepared, $250,000 has been budgeted, and it is anticipated that the work will be well along by the time this article appears. Plans are now being prepared for landscaping that portion of the route now under construction between Saratoga Avenue and Saratoga-Sunnyvale Road.

And this is the design story of Interstate Route 280, the "Junípero Serra" Freeway, the freeway that will traverse some 50 miles of the most beautiful countryside in California.

The route's broad curves and gently rolling profile will unfold new scenic delights to the eye of the motorist from the rugged ridges and forested slopes, past the lakes and through the foothills of Santa Clara County. The split-level, variable-width-median design of the freeway and the new architectural features of the more than 70 structures will add to the enjoyment of the motorist.

With construction underway from San Francisco south and San Jose north, many new contracts wil be let during the next few years. The final work in the vicinity of the San Mateo-Santa Clara county line should be completed or under construction within five years. This new freeway will afford much needed relief for traffic using the heavily congested Bayshore Freeway and El Camino Real, and, undoubtedly, will change the driving—and even the living habits—of many Peninsulans.

Calif. (4) Division of Highways

FREEWAY STUDIES:

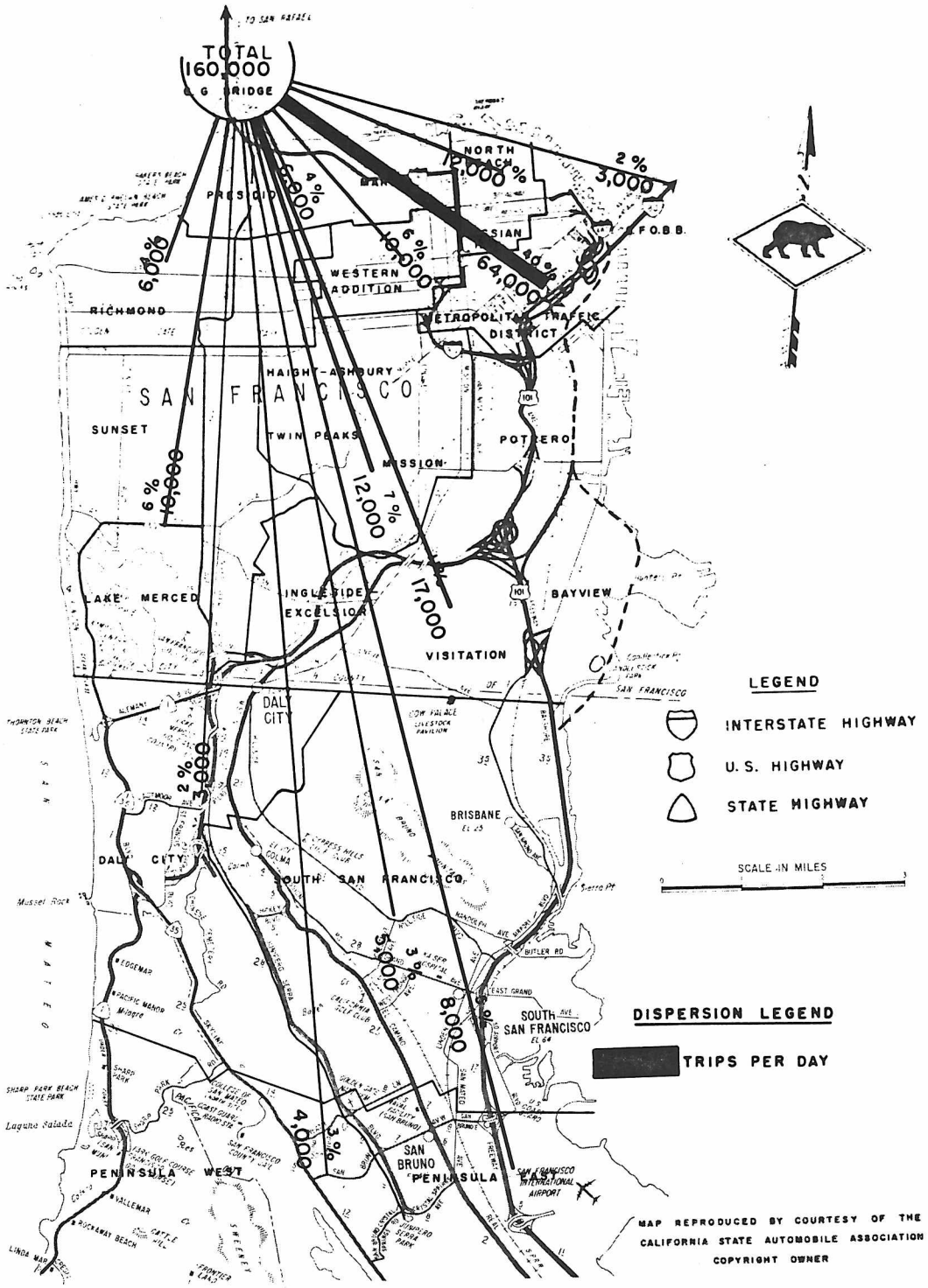
PANHANDLE PARKWAY AND GOLDEN GATE FREEWAY

Pam
Sep
Doc
Class

STATE OF CALIFORNIA · DEPARTMENT OF PUBLIC WORKS · DIVISION OF HIGHWAYS
ROBUR · DIRECTUM · SCIENTIA · EST · VIA · FORTUNAE

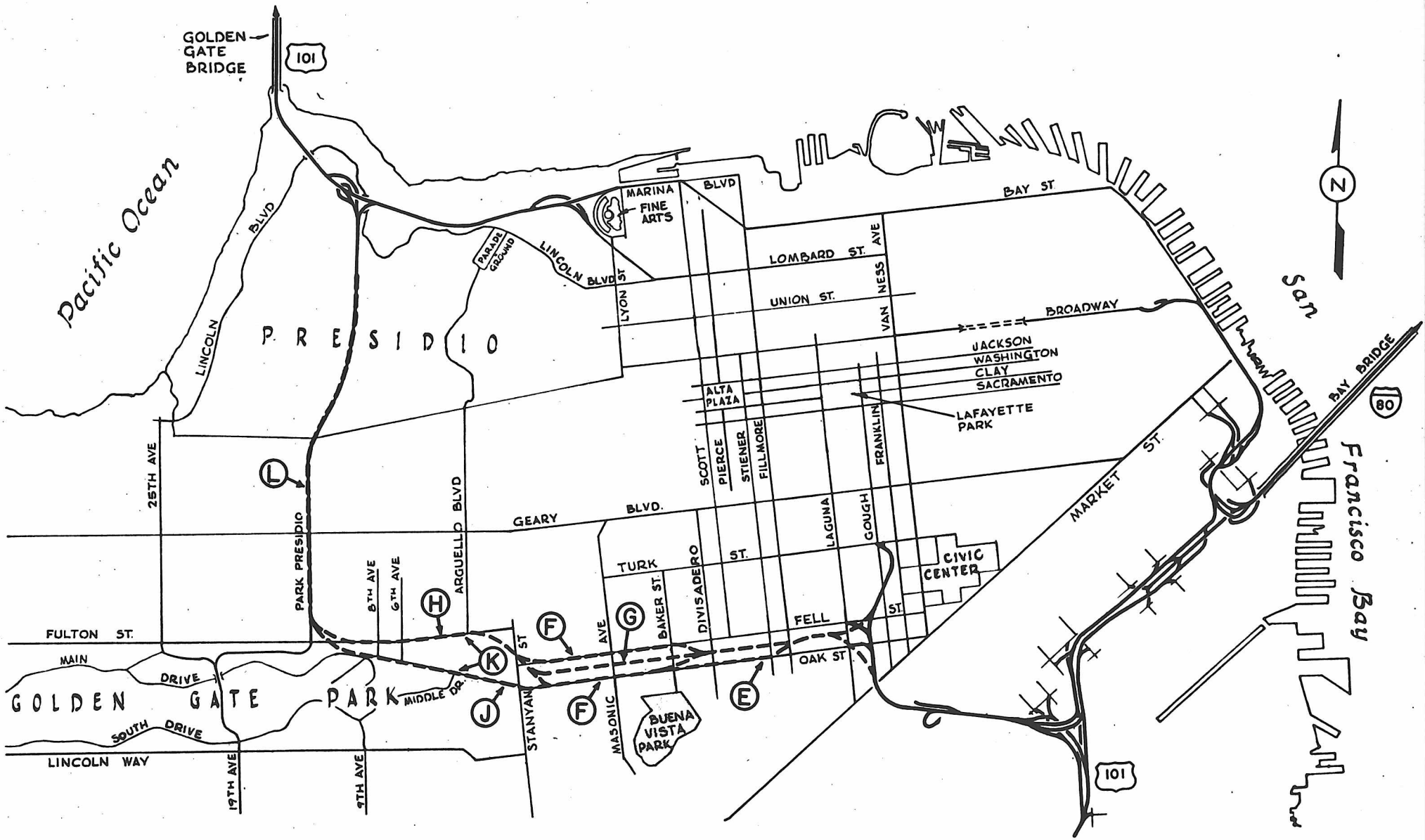
A SUPPLEMENT TO TECHNICAL REPORTS

FEBRUARY 1966

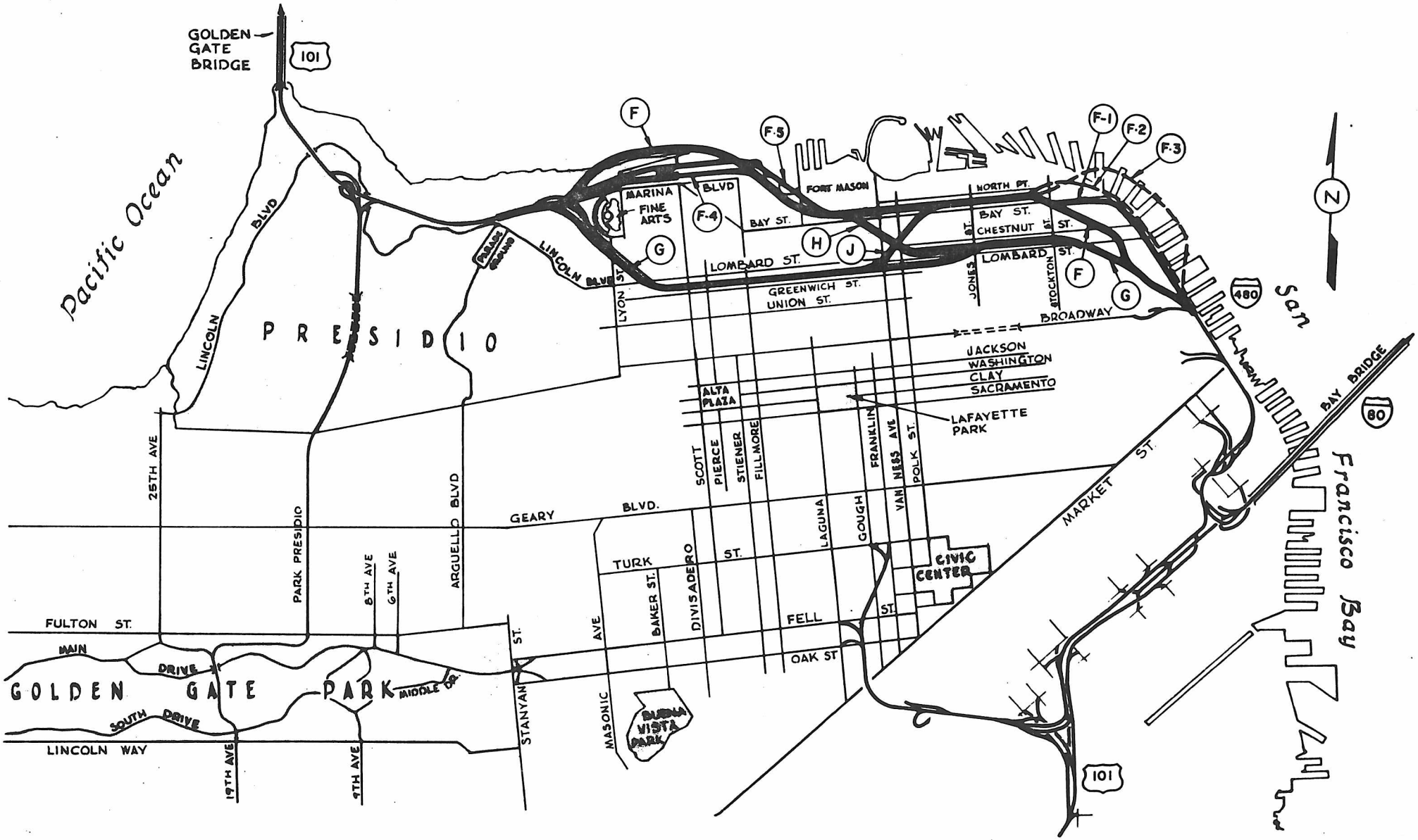


MAP REPRODUCED BY COURTESY OF THE CALIFORNIA STATE AUTOMOBILE ASSOCIATION
COPYRIGHT OWNER

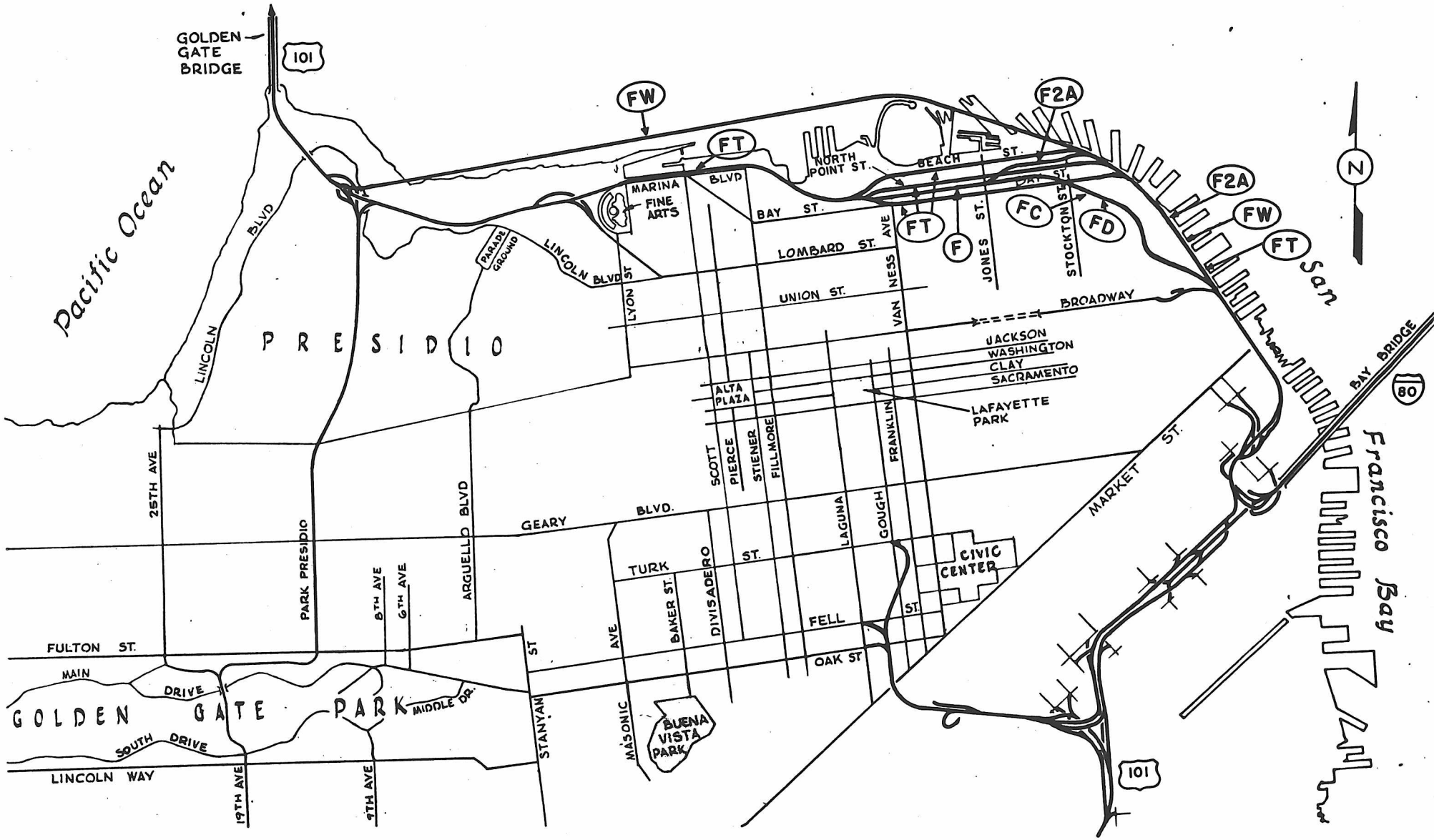
1985 GOLDEN GATE BRIDGE TRAFFIC DISPERSION



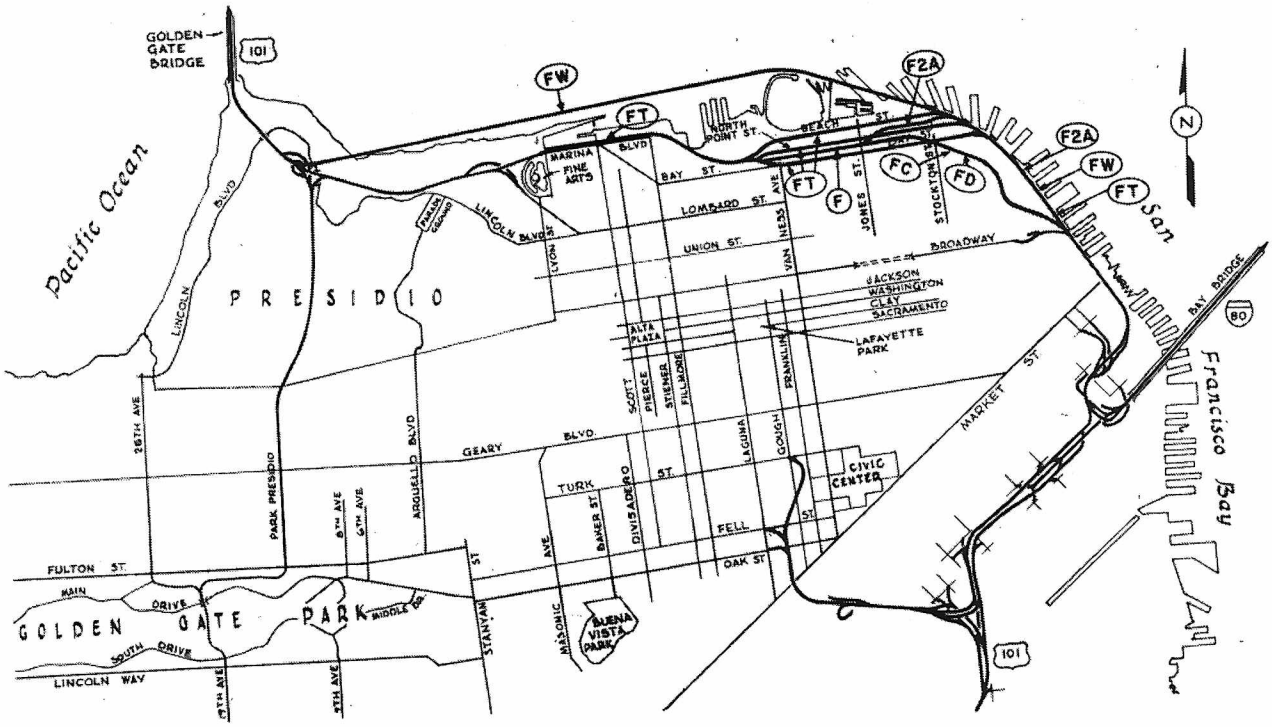
PANHANDLE PARKWAY LOCATION MAP



GOLDEN GATE FREEWAY
LOCATION MAP – MARCH 1965

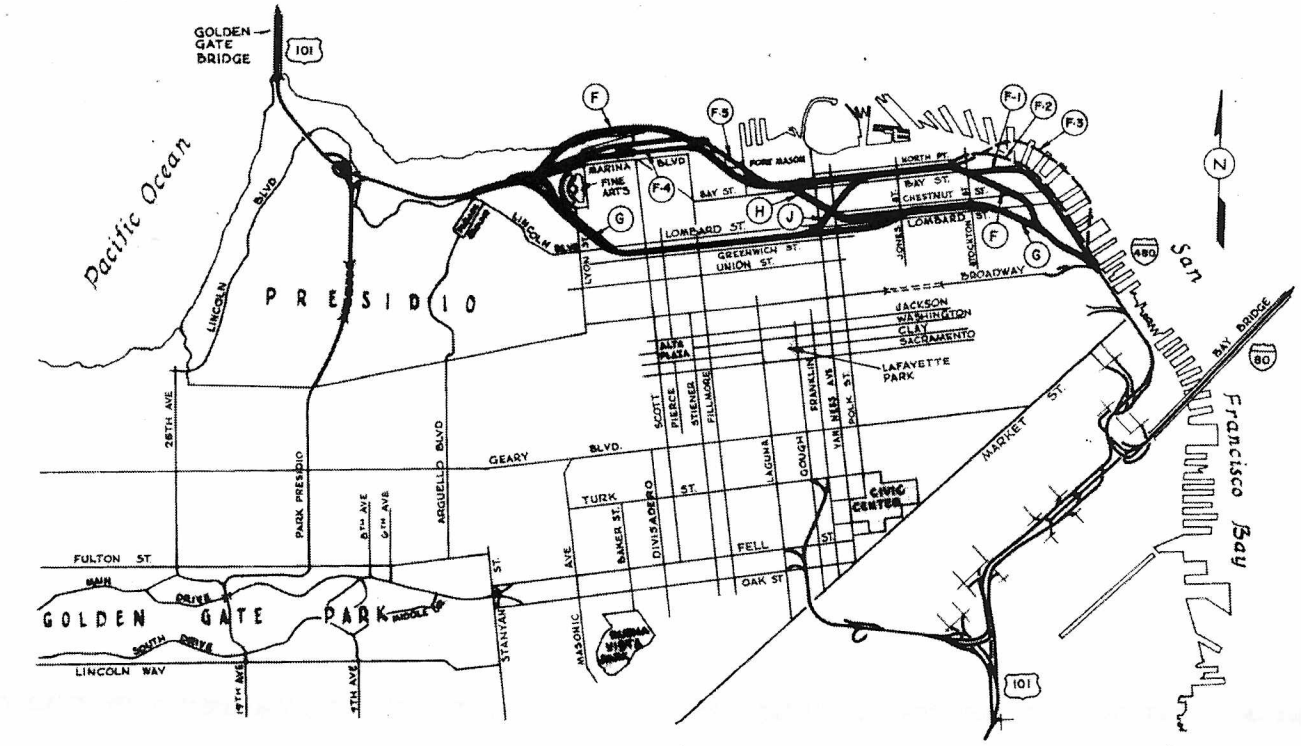


GOLDEN GATE FREEWAY
LOCATION MAP – FEBRUARY 1966



GOLDEN GATE FREEWAY

LOCATION MAP – FEBRUARY 1966



GOLDEN GATE FREEWAY
LOCATION MAP – MARCH 1965

LEGEND

oooo STRUCTURE

——— GRADED

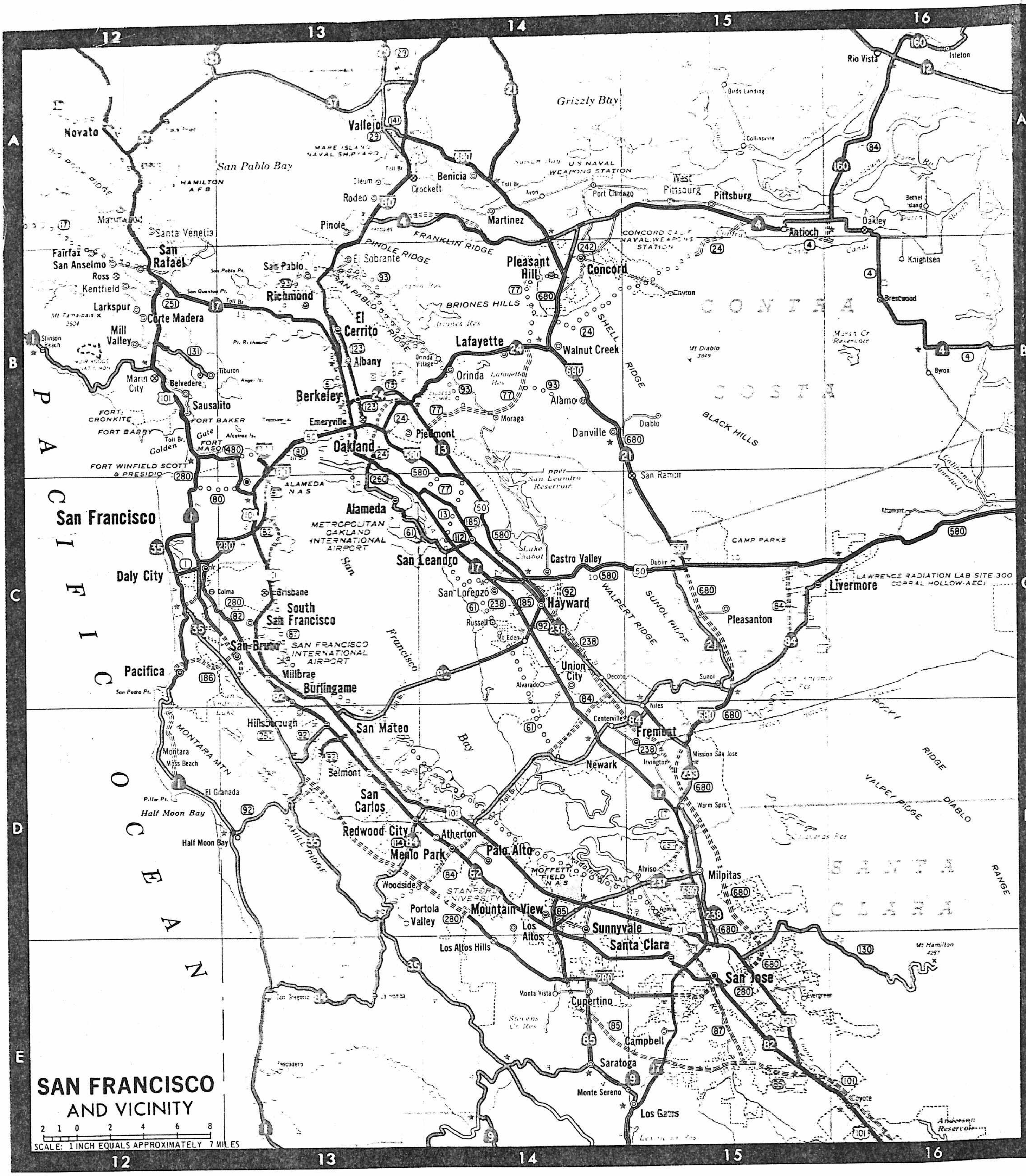
– – – – TUNNEL

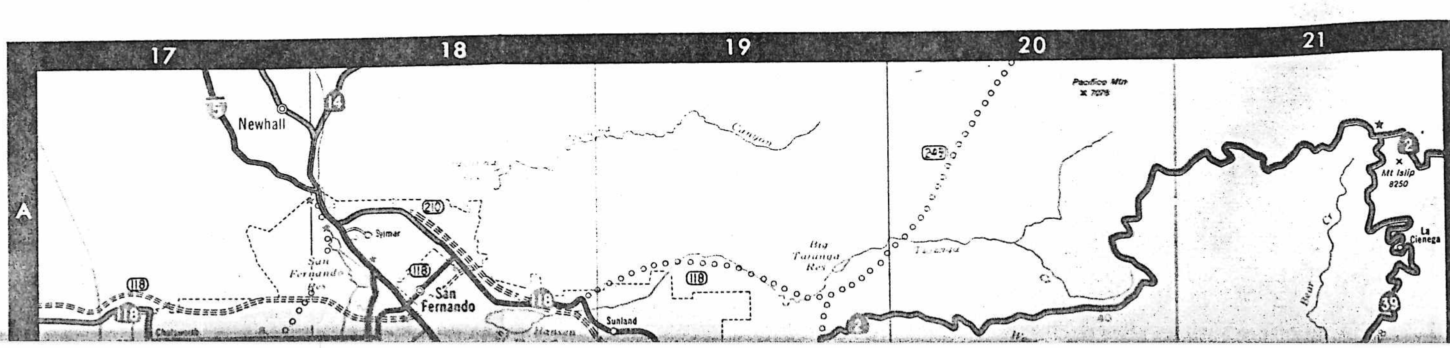
LOOKING WEST
EMBARCADERO IN FOREGROUND

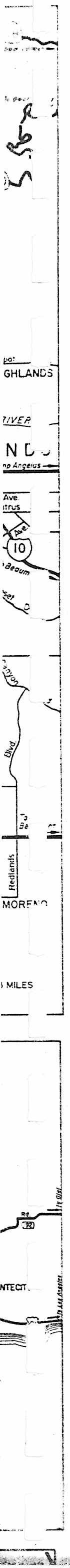
CALIFORNIA
STATE HIGHWAY MAP
1967

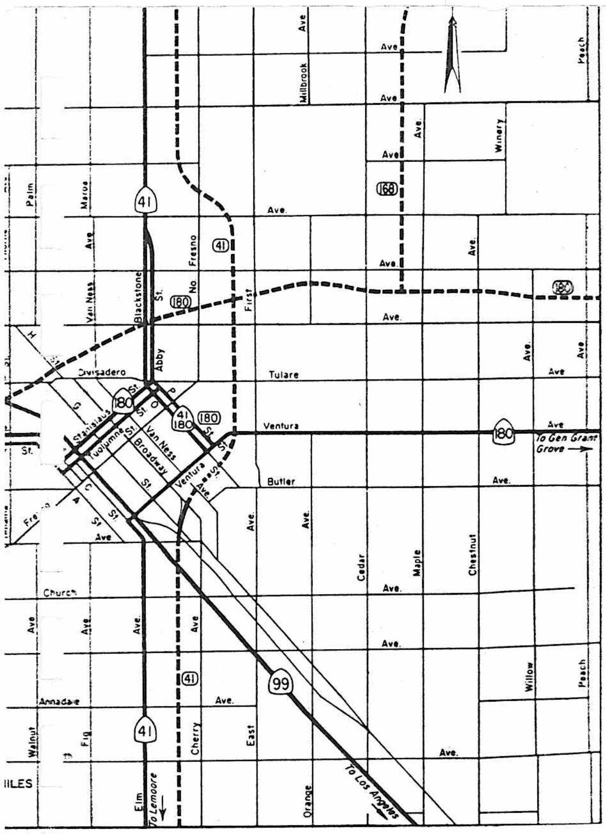
ISSUED BY

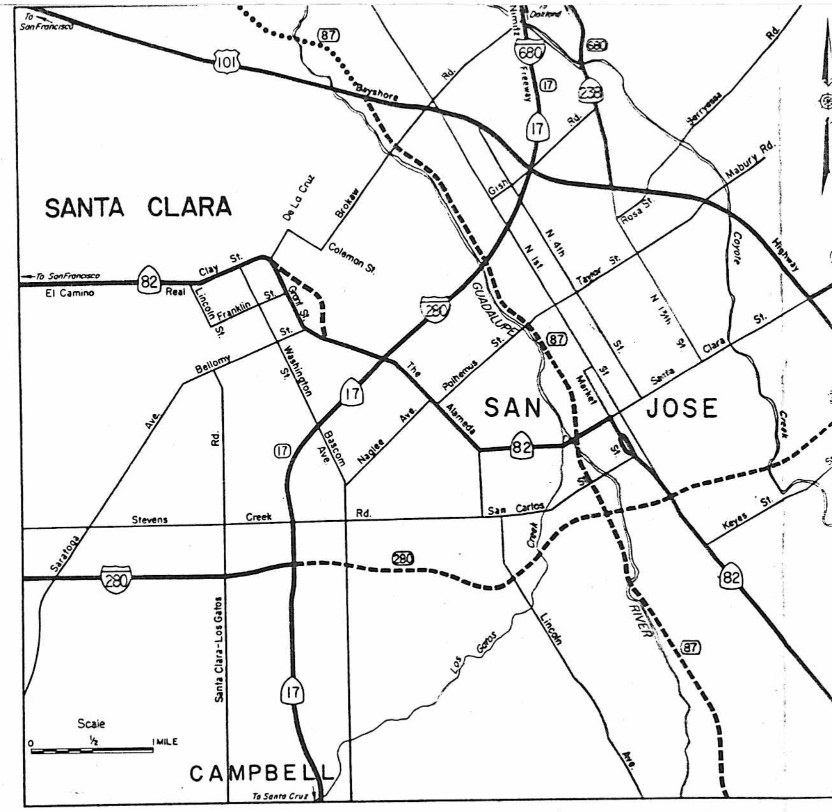
TRANSPORTATION AGENCY
STATE DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS

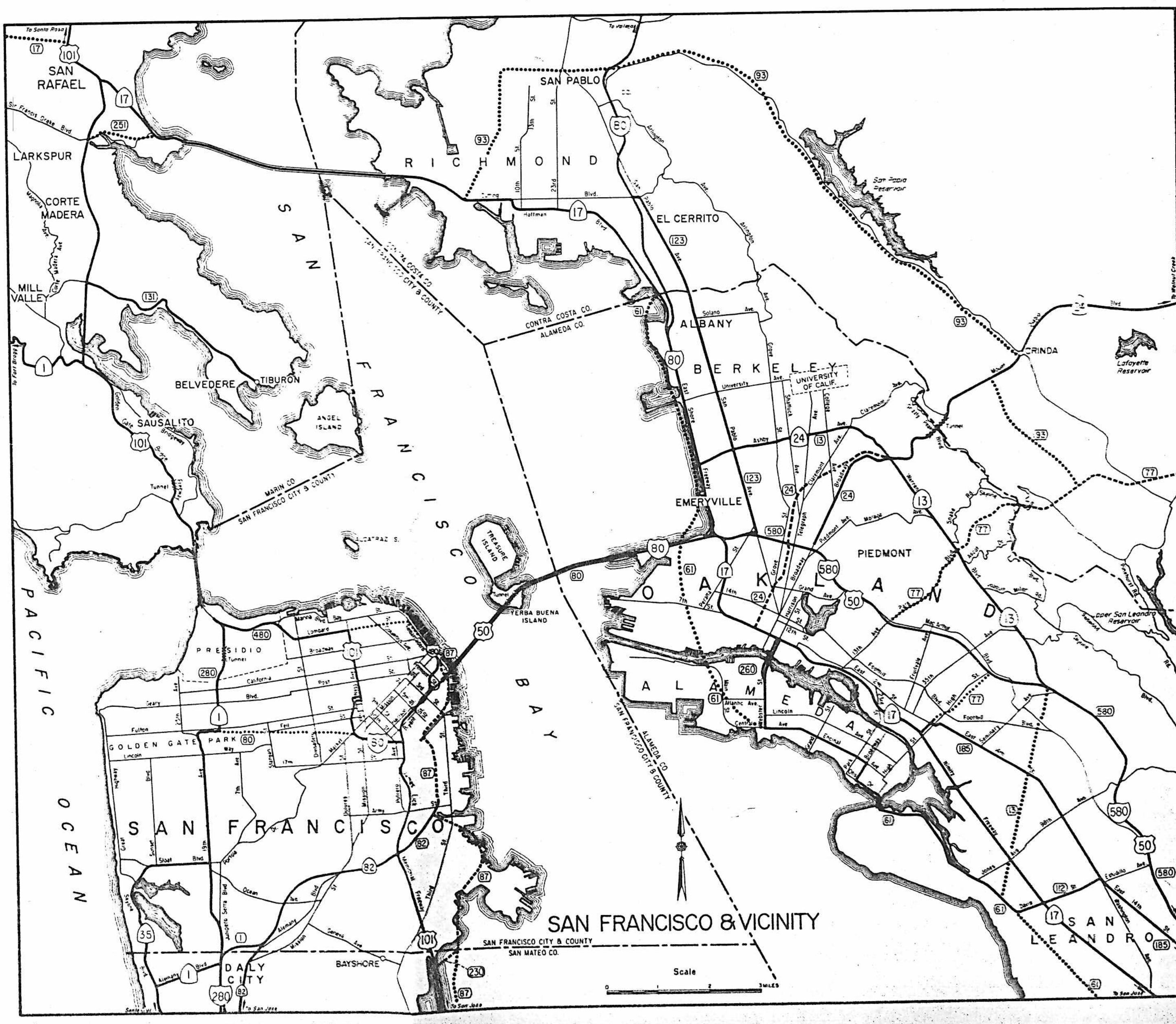

SAN FRANCISCO
AND VICINITY
SCALE: 1 INCH EQUALS APPROXIMATELY 7 MILES
12
13
14
15
16
A
B
C
D
E
Novato
Vallejo
Rio Vista
Isleton
Grizzly Bay
San Pablo Bay
HAMILTON AFB
MARE ISLAND NAVAL SHIPYARD
U S NAVAL WEAPONS STATION
Benicia
Crockett
Rodeo
Pinole
Martinez
Port Chicago
West Pittsburg
Pittsburg
Antioch
Oakley
Knightsen
Brentwood
Byron
Collinsville
Birds Landing
FRANKLIN RIDGE
PINOLE RIDGE
CONCORD NAVAL WEAPONS STATION
Santa Venetia
San Rafael
Fairfax
San Anselmo
Ross
Kentfield
Larkspur
Corte Madera
Mill Valley
Stinson Beach
San Pablo
El Sobrante
Richmond
Pleasant Hill
Concord
Clayton
BRIONES HILLS
El Cerrito
Albany
Lafayette
Walnut Creek
Mt Diablo
CONTRA COSTA
Tiburon
Belvedere
Marin City
Sausalito
FORT CRONKITE
FORT BAKER
FORT BARRY
Golden Gate
FORT MASON
Berkeley
Orinda
Moraga
Alamo
Danville
Diablo
BLACK HILLS
SHELL RIDGE
Emeryville
Piedmont
Oakland
FORT WINFIELD SCOTT & PRESIDIO
San Ramon
San Francisco
ALAMEDA NAS
Alameda
METROPOLITAN OAKLAND INTERNATIONAL AIRPORT
San Leandro
Castro Valley
Dublin
CAMP PARKS
LAWRENCE RADIATION LAB SITE 300
Livermore
Pleasanton
Altamont
Daly City
Colma
Brisbane
South San Francisco
San Lorenzo
Hayward
WALPERT RIDGE
SUNOL RIDGE
San Bruno
SAN FRANCISCO INTERNATIONAL AIRPORT
Pacifica
Millbrae
Burlingame
Union City
Alvarado
Decoto
Sunol
Niles
Fremont
Centerville
Hillsborough
San Mateo
MONTARA MTN
Montara
Moss Beach
El Granada
Half Moon Bay
Belmont
San Carlos
Newark
Irvington
Mission San Jose
Warm Springs
Redwood City
Atherton
Menlo Park
Palo Alto
MOFFETT FIELD NAS
STANFORD UNIVERSITY
Woodside
Portola Valley
Mountain View
Los Altos
Los Altos Hills
Sunnyvale
Santa Clara
Alviso
Milpitas
San Jose
Mt Hamilton
Monta Vista
Cupertino
Campbell
Saratoga
Monte Sereno
Los Gatos
Coyote
Anderson Reservoir
SANTA CLARA RANGE
DIABLO RIDGE
PACIFIC OCEAN
San Francisco Bay

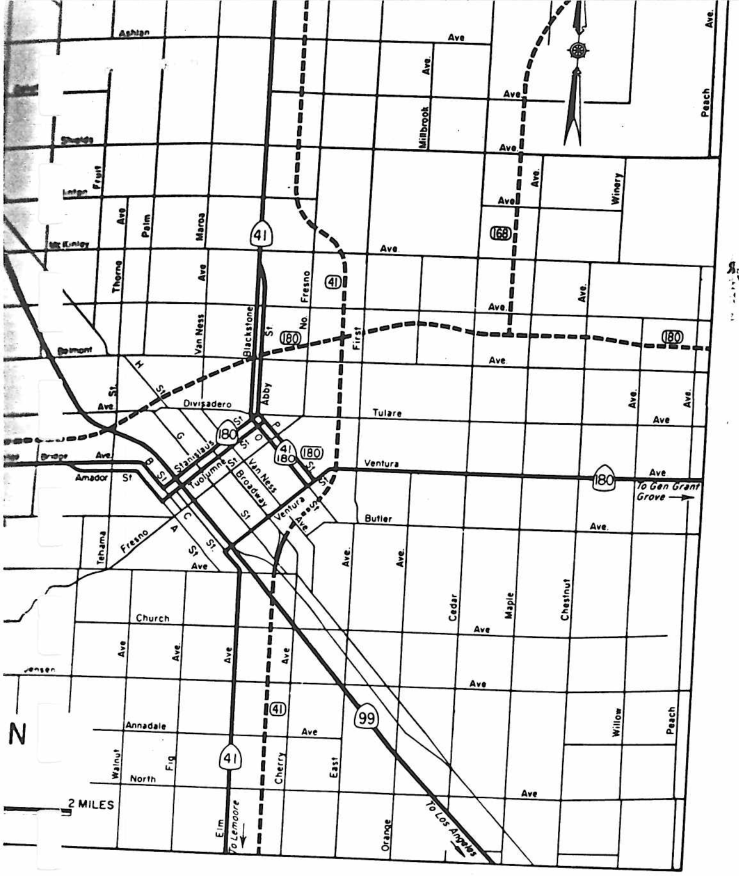

17
18
19
20
21
A
Newhall
Sylmar
San Fernando
Big Tujunga Res
Pacifico Mtn
Mt Islip
La Cienega
Sunland


GHLANDS
Ave.
MORENO
MILES

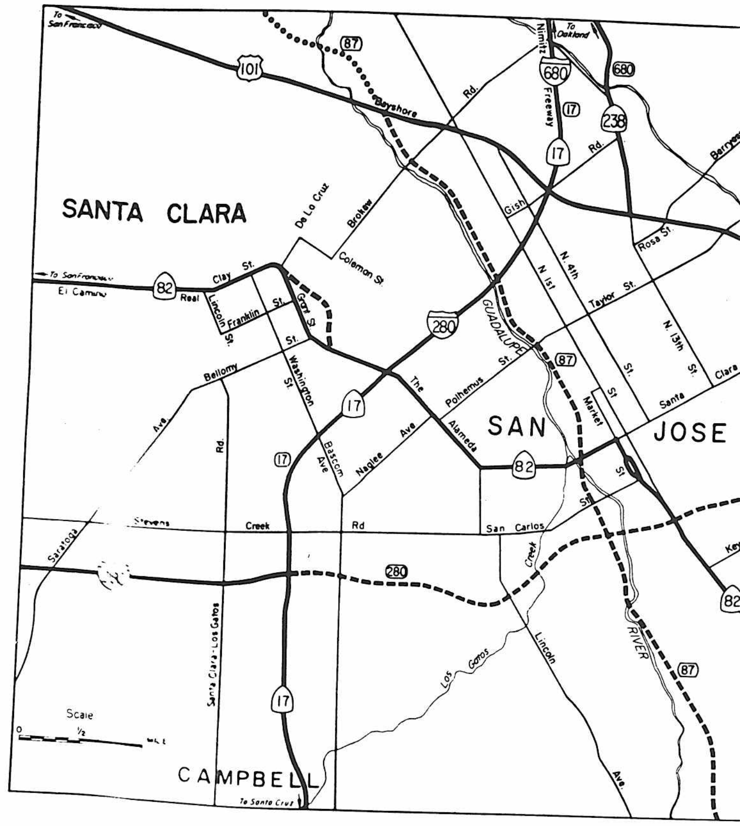

Palm
Maroa
Van Ness
Blackstone
Fresno
First
Millbrook
Winery
Peach
Ave
Divisadero
Tulare
Ventura
To Gen Grant Grove
Butler
Church
Annadale
Walnut
Fig
Cherry
East
Orange
Cedar
Maple
Chestnut
Willow
Elm
To Lemoore
To Los Angeles
Stanislaus
Tuolumne
Broadway
Abby
41
180
168
99

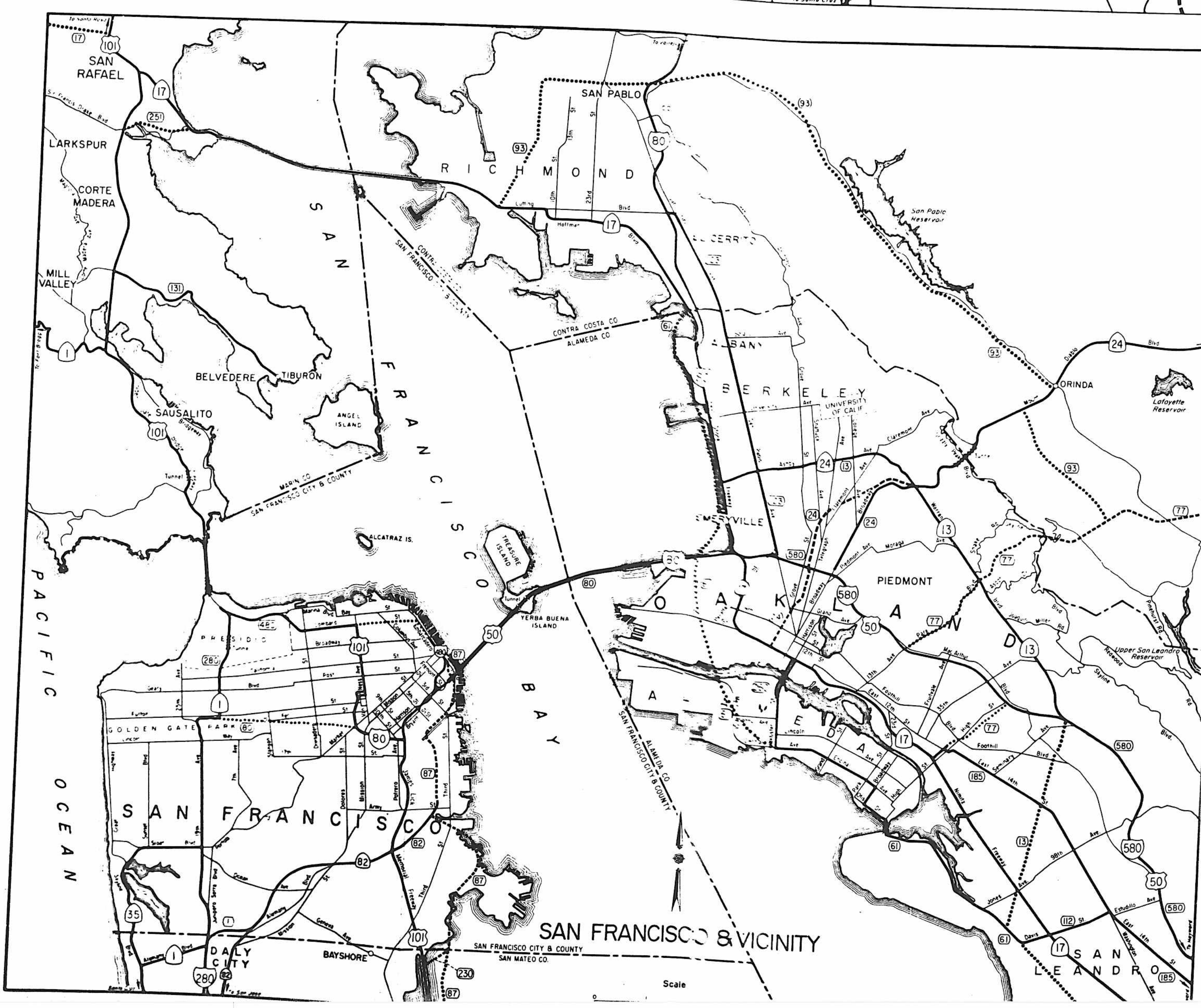

To San Francisco
SANTA CLARA
SAN JOSE
CAMPBELL
Bayshore
El Camino Real
Clay St.
Lincoln St.
Franklin St.
Washington St.
De La Cruz
Brokaw Rd.
Coleman St.
GUADALUPE
RIVER
The Alameda
Naglee Ave.
Bascom Ave.
Bellomy
Stevens Creek Rd.
Saratoga Ave.
Santa Clara-Los Gatos Rd.
San Carlos
Keyes St.
Santa Clara St.
Taylor St.
Mabury Rd.
Berryessa Rd.
Coyote Creek
Los Gatos Creek
Lincoln Ave.
Nimitz Freeway
To Oakland
To Santa Cruz
Scale
1 MILE
101
680
238
17
82
280
87


SAN FRANCISCO & VICINITY
SAN RAFAEL
LARKSPUR
CORTE MADERA
MILL VALLEY
SAUSALITO
BELVEDERE
TIBURON
ANGEL ISLAND
SAN PABLO
RICHMOND
EL CERRITO
ALBANY
BERKELEY
UNIVERSITY OF CALIF.
EMERYVILLE
PIEDMONT
OAKLAND
ALAMEDA
SAN LEANDRO
ORINDA
TREASURE ISLAND
YERBA BUENA ISLAND
PRESIDIO
GOLDEN GATE PARK
SAN FRANCISCO
DALY CITY
BAYSHORE
PACIFIC OCEAN
SAN FRANCISCO BAY
San Pablo Reservoir
Lafayette Reservoir
Upper San Leandro Reservoir
CONTRA COSTA CO.
ALAMEDA CO.
MARIN CO.
SAN FRANCISCO CITY & COUNTY
SAN MATEO CO.
To Santa Rosa
To Vallejo
To San Jose
Scale
3 MILES
101
17
1
251
131
93
80
123
24
13
580
50
77
61
260
185
112
35
280
82
87
230
480
Alcatraz


Ashlan
Shields
Clinton
McKinley
Belmont
Divisadero
Tulare
Ventura
Butler
Church
Annadale
North
Jensen
Blackstone
First
Fresno
Van Ness
To Gen Grant Grove
To Lemoore
To Los Angeles
2 MILES

67


To San Francisco
To Oakland
Bayshore
SANTA CLARA
El Camino Real
Stevens Creek Rd
SAN JOSE
The Alameda
Guadalupe River
CAMPBELL
To Santa Cruz
Scale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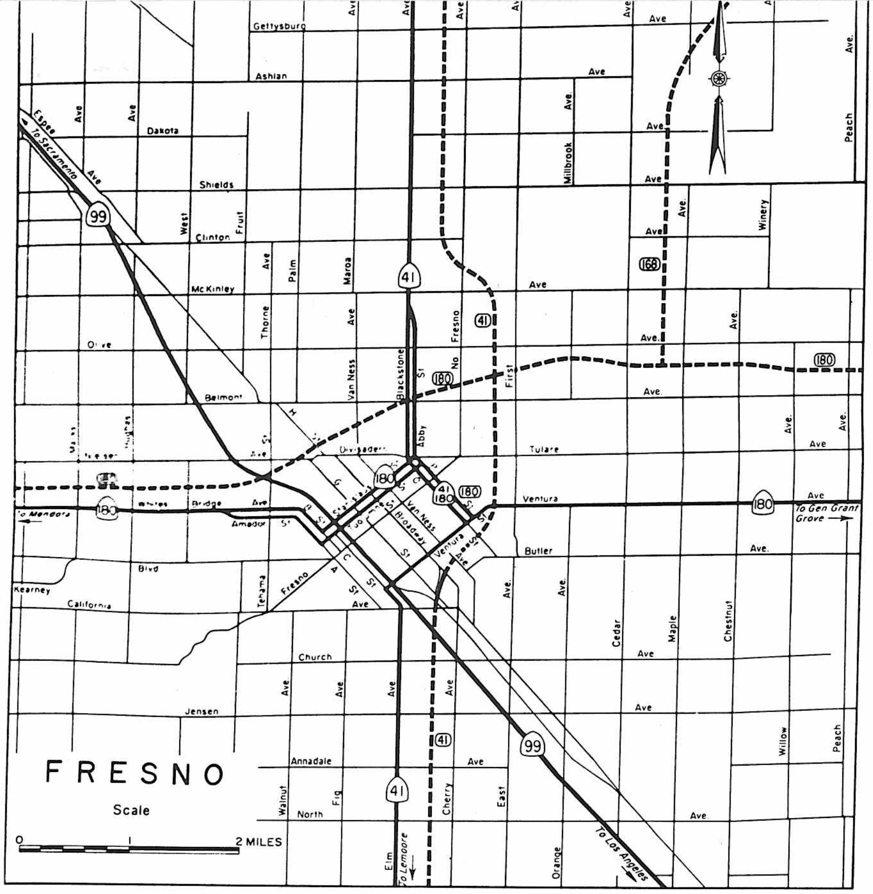
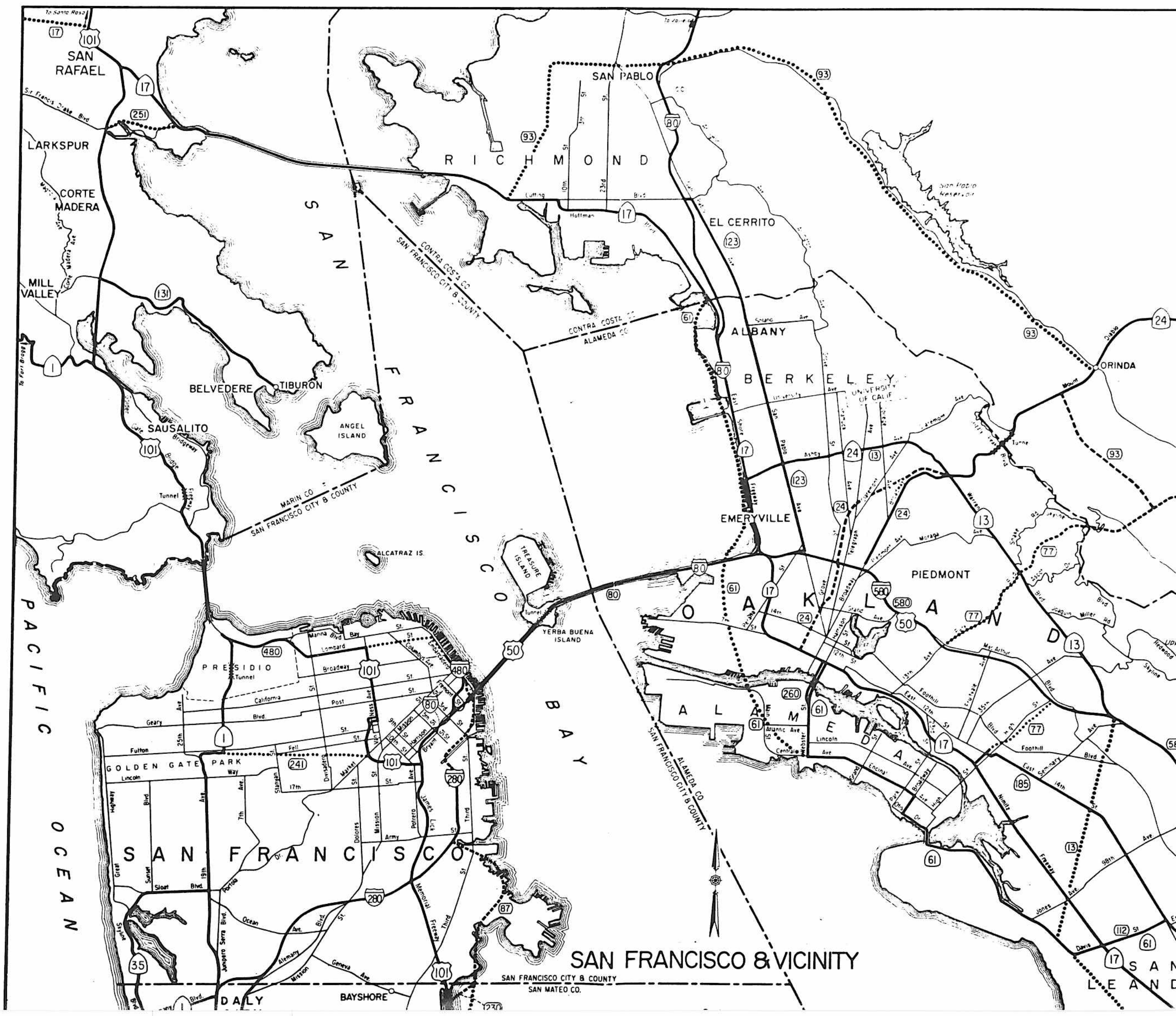
CORTE MADERA
MILL VALLEY
SAUSALITO
BELVEDERE
TIBURON
ANGEL ISLAND
SAN PABLO
RICHMOND
EL CERRITO
ALBANY
BERKELEY
UNIVERSITY OF CALIF
EMERYVILLE
ORINDA
PIEDMONT
OAKLAND
ALAMEDA
SAN LEANDRO
SAN FRANCISCO BAY
ALCATRAZ IS.
TREASURE ISLAND
YERBA BUENA ISLAND
PRESIDIO
GOLDEN GATE PARK
SAN FRANCISCO
PACIFIC OCEAN
DALY CITY
BAYSHORE
San Pablo Reservoir
Lafayette Reservoir
Upper San Leandro Reservoir
CONTRA COSTA CO
ALAMEDA CO
MARIN CO
SAN FRANCISCO CITY & COUNTY
SAN MATEO CO.
SAN FRANCISCO & VICINITY
Scale


To Stockton


FRESNO
Scale
0
1
2 MILES
To Sacramento
To Mendota
To Gen Grant Grove
To Lemoore
To Los Angeles
Gettysburg
Ashlan
Dakota
Shields
Clinton
McKinley
Olive
Belmont
Tulare
Ventura
Butler
California
Church
Jensen
Annadale
North
Blackstone
Abby
Van Ness
Maroa
Palm
Thorne
West
Fruit
First
Millbrook
Winery
Peach
Cedar
Maple
Chestnut
Willow
Orange
Cherry
East
Elm
Fig
Walnut
Tehama
Kearney
Divisadero
Broadway
Amador
Bridge

69


SANTA CLARA
CAMPBELL
To San Francisco
To Santa Cruz
Scale
0
1/2
1 MILE
Bayshore
El Camino
Real
Clay St
Franklin St
Lincoln St
De La Cruz
Brokaw
Coleman St
Bellomy
Washington St
Bascom Ave
Naglee Ave
The Alameda
Polhemus
Stevens
Creek
Rd
Saratoga
Santa Clara-Los Gatos Rd
TEMP 280


SAN FRANCISCO & VICINITY
SAN RAFAEL
LARKSPUR
CORTE MADERA
MILL VALLEY
SAUSALITO
BELVEDERE
TIBURON
ANGEL ISLAND
ALCATRAZ IS.
TREASURE ISLAND
YERBA BUENA ISLAND
SAN PABLO
RICHMOND
EL CERRITO
ALBANY
BERKELEY
UNIVERSITY OF CALIF
EMERYVILLE
PIEDMONT
OAKLAND
ALAMEDA
ORINDA
SAN LEANDRO
PRESIDIO
GOLDEN GATE PARK
SAN FRANCISCO
DALY
BAYSHORE
PACIFIC OCEAN
SAN FRANCISCO BAY
San Pablo Reservoir
MARIN CO.
SAN FRANCISCO CITY & COUNTY
CONTRA COSTA CO.
ALAMEDA CO.
SAN MATEO CO.

THE CALIFORNIA FREEWAY and EXPRESSWAY SYSTEM:

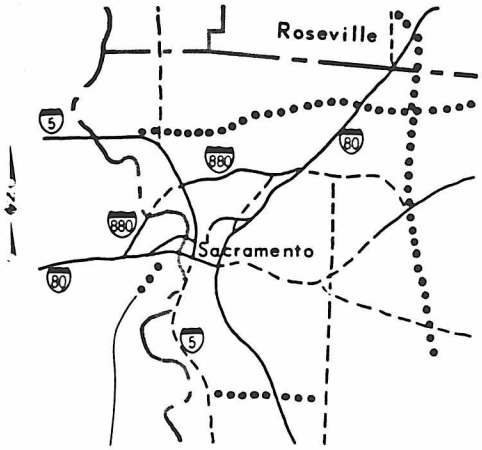
1968 PROGRESS and PROBLEMS

PREPARED PURSUANT TO
SENATE RESOLUTION NO. 154
1968 REGULAR SESSION

STATE OF CALIFORNIA
BUSINESS AND TRANSPORTATION AGENCY
DEPARTMENT OF PUBLIC WORKS

MARCH 1969

Development and traffic needs in the major urban areas require that nearly all of their designated Freeway and Expressway System be developed as full freeways by 1988. Values of full freeway design may justify all System routes to be so planned when given further study.

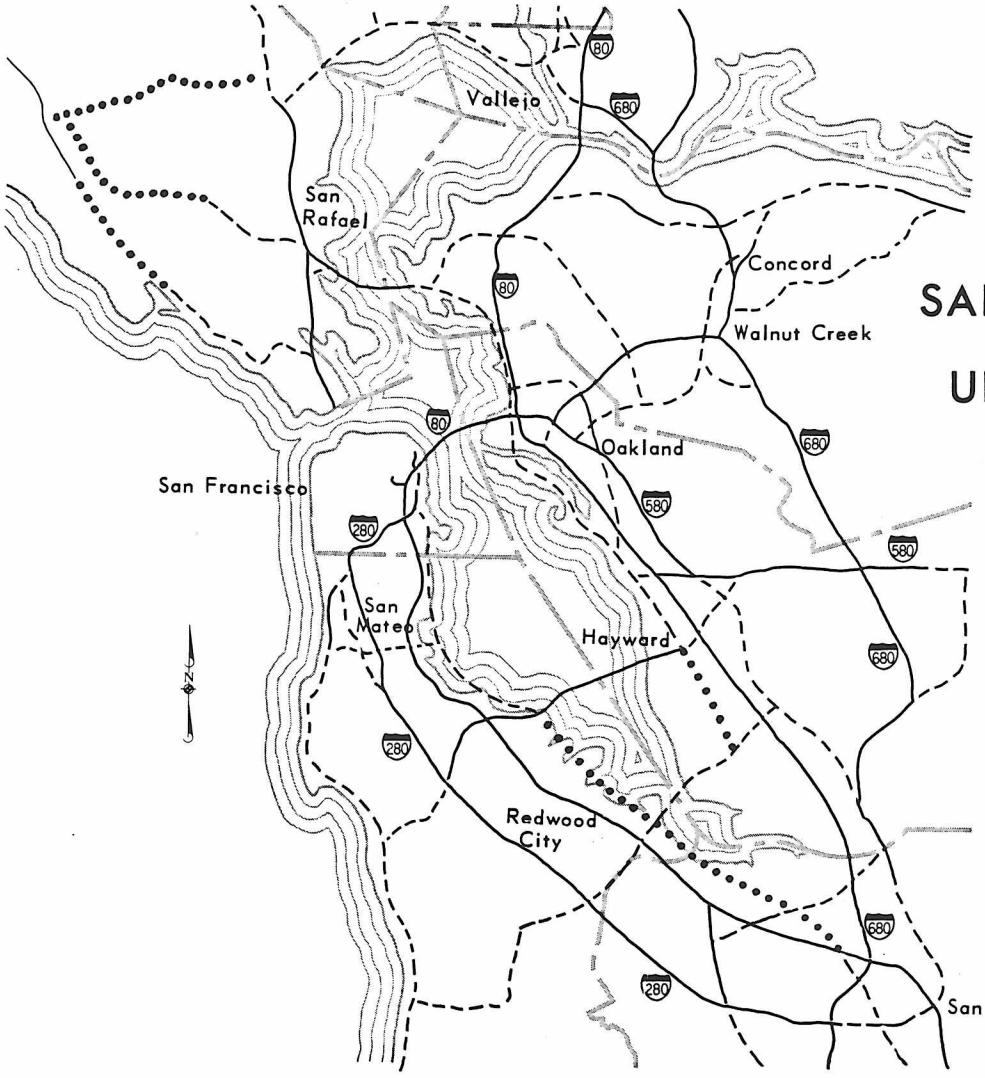


SACRAMENTO URBAN AREA

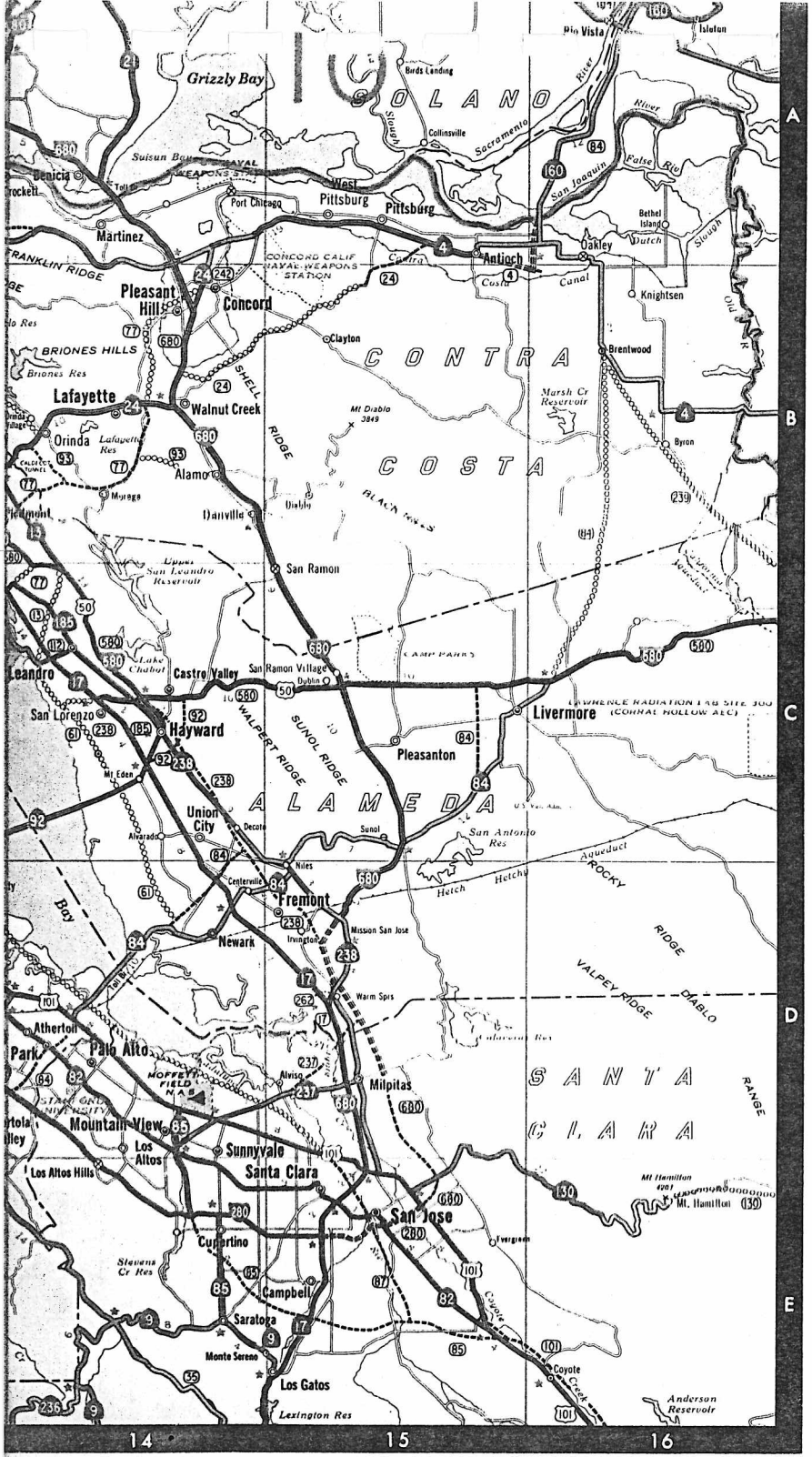
Legend

	Existing, Under Construction, or Budgeted	Needed 1968-1978	Needed 1978-1988
Full Freeways	———	– – – – –	• • • • • • • •
Multi-lane Expressways	———	– – – – –	• • • • • • • •
All Other Freeway and Expressway Routes	———		
Interstate Routes	80	80	
County Boundaries	——— – – ——— – – ———		

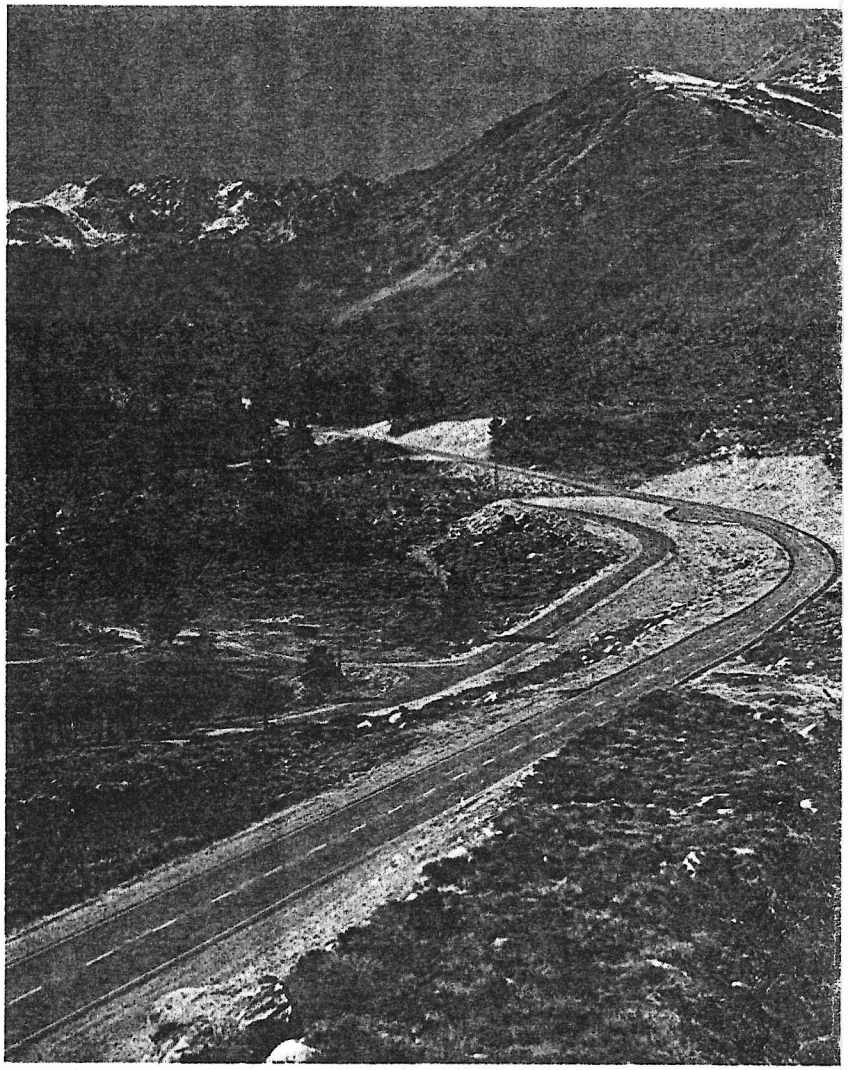
SCALE IN MILES
0 5 10



SAN FRANCISCO URBAN AREA

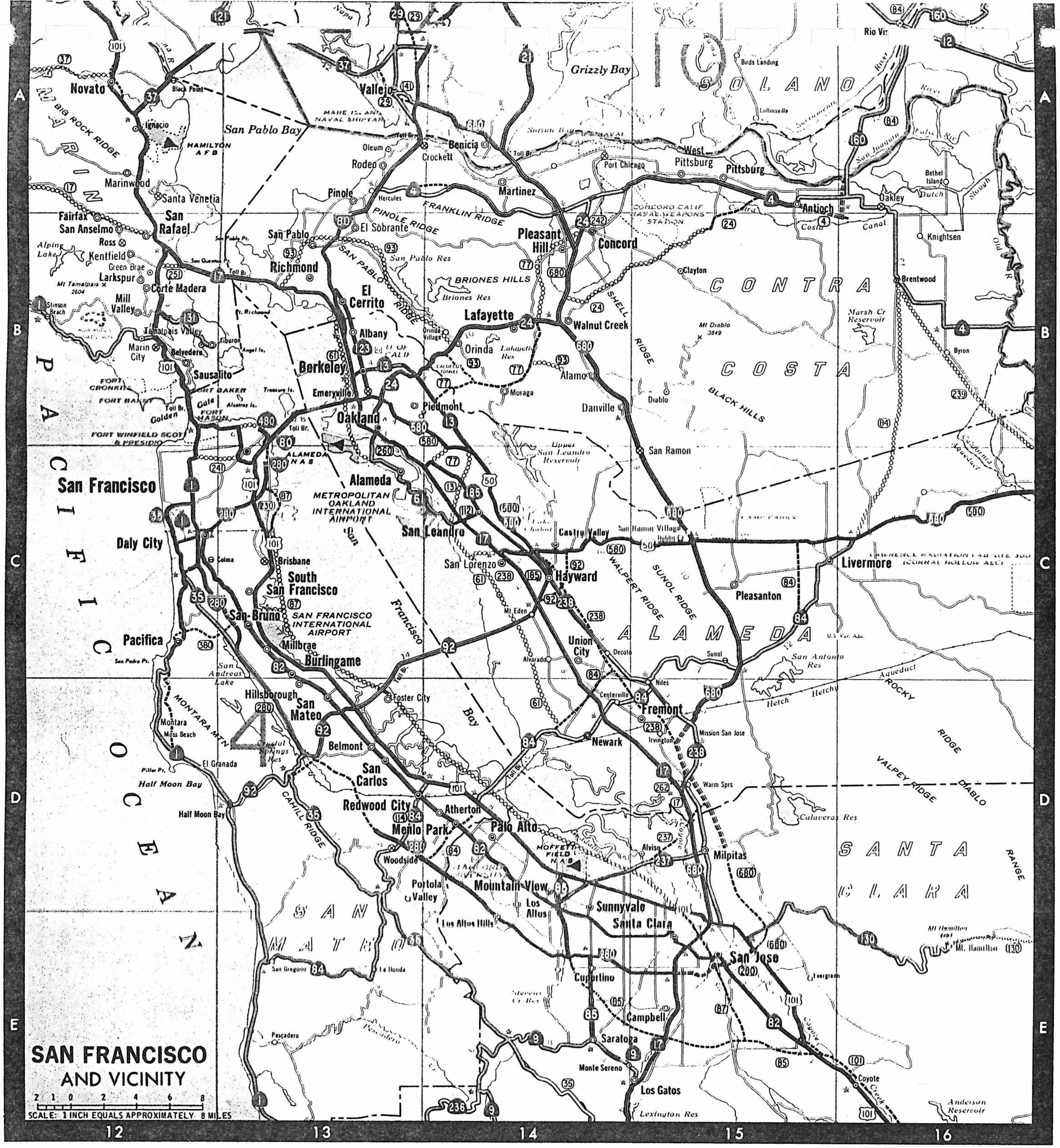


CALIFORNIA
STATE HIGHWAY MAP
1970



ISSUED BY

BUSINESS AND TRANSPORTATION AGENCY
STATE DEPARTMENT OF PUBLIC WORKS
DIVISION OF HIGHWAYS



SAN FRANCISCO
AND VICINITY
SCALE: 1 INCH EQUALS APPROXIMATELY 8 MILES
San Pablo Bay
Grizzly Bay
SOLANO
MARIN
CONTRA COSTA
ALAMEDA
SANTA CLARA
SAN MATEO
PACIFIC OCEAN
San Francisco Bay
Novato
Vallejo
Benicia
Crockett
Martinez
Pittsburg
Antioch
Oakley
Brentwood
San Rafael
Richmond
El Cerrito
Albany
Berkeley
Emeryville
Oakland
Alameda
Piedmont
Orinda
Lafayette
Walnut Creek
Concord
Pleasant Hill
Danville
San Ramon
San Leandro
Castro Valley
Hayward
Livermore
Pleasanton
Union City
Fremont
Newark
Milpitas
San Jose
Santa Clara
Sunnyvale
Mountain View
Palo Alto
Menlo Park
Redwood City
San Carlos
Belmont
San Mateo
Burlingame
Millbrae
San Bruno
South San Francisco
Daly City
Pacifica
Half Moon Bay
Sausalito
Mill Valley
Cupertino
Campbell
Saratoga
Los Gatos
Mt Diablo 3849
METROPOLITAN OAKLAND INTERNATIONAL AIRPORT
SAN FRANCISCO INTERNATIONAL AIRPORT
A
B
C
D
E
12
13
14
15
16